



Arlington Conservation Commission

Date: Thursday, September 21, 2023

Time: 7:00 PM

Location: Conducted by Remote Participation

Please register in advance for this meeting. Reference materials, instructions, and access information for this specific meeting will be available 48 hours prior to the meeting on the Commission's agenda and minutes page. This meeting will be conducted in a remote format consistent with Chapter 2 of the Acts of 2023, which further extends certain COVID-19 measures regarding remote participation in public meetings until March 31, 2025. Please note: Not all items listed may in fact be discussed and other items not listed may be brought up for discussion to the extent permitted by law. This agenda includes those matters which can be reasonably anticipated to be discussed at the meeting.

Agenda

1. Administrative
 - a.
 - b. Correspondence Received.
All correspondence is available to the public. For a full list, contact the Conservation Agent at concomm@town.arlington.ma.us.
2. Discussion
 - a. Enforcement Order: 65 Dudley Street.
 - b. Enforcement Order: 451 and 455 Mystic Street.
 - c. Request for Permit Amendment: 88 Coolidge Road.
 - d. CPA Updates.

3. Hearings

Request for Determination of Applicability: 65 Dudley Street.

Request for Determination of Applicability: 65 Dudley Street.

The Conservation Commission will hold a public hearing to consider a Request for Determination of Applicability for the expansion of a driveway and construction of a retaining wall at 65 Dudley Street in Arlington.

Notice of Intent: Thorndike Place.

Notice of Intent: Thorndike Place.

The Conservation Commission will hold a public hearing under the Wetlands Protection Act to consider a Notice of Intent for the construction of Thorndike Place, a multifamily development on Dorothy Road in Arlington.

Request for Determination of Applicability: 70 Medford Street (Mt. Pleasant Cemetery Columbarium).

Request for Determination of Applicability: 70 Medford Street (Mt. Pleasant Cemetery Columbarium).

The Conservation Commission will hold a public hearing to consider a Request for Determination of Applicability for the construction of a footpath at 70 Medford Street.



Town of Arlington, Massachusetts

Correspondence Received.

Summary:

Correspondence Received.

All correspondence is available to the public. For a full list, contact the Conservation Agent at concomm@town.arlington.ma.us.

ATTACHMENTS:

	Type	File Name	Description
▢	Reference Material	Correspondence_Received_-_Water_Chestnut_Harvesting_at_the_res.pdf	Correspondence Received - Water Chestnut Harvesting at the Res
▢	Reference Material	Correspondence_Received_-_Large_Tire_in_Reservoir.pdf	Correspondence Received - Large Tire in Reservoir
▢	Reference Material	Correspondence_Received_-_43_Beverly_Road_Dock.pdf	Correspondence Received - 43 Beverly Road Dock
▢	Reference Material	Correspondence_Received_-_Artificial_Turf_Hazards.pdf	Correspondence Received - Artificial Turf Hazards
▢	Reference Material	Correspondence_Received_-_No_Mow_Zone_at_McClennen.pdf	Correspondence Received - No Mow Zone at McClennen

Fw: WC Harvesting at the Res

David Morgan <dmorgan@town.arlington.ma.us>

Mon 9/18/2023 4:53 PM

To: David Morgan <dmorgan@town.arlington.ma.us>

Bcc: Brian McBride <brianmcb@outlook.com>; ctirone@ci.reading.ma.us <ctirone@ci.reading.ma.us>; David Kaplan <dkaplan31@gmail.com>; dwhite@gilbertwhite.com <dwhite@gilbertwhite.com>; mikeg125@gmail.com <mikeg125@gmail.com>; NStevens@McGregorLaw.com <NStevens@McGregorLaw.com>; Susan Chapnick <s.chapnick@comcast.net>

Please take a moment to celebrate the good work MyRWA accomplished this summer getting our volunteer water chestnut harvesting at the Res back up and running. Credit to our own David White for being the point of contact for the Res Committee/ConCom.

Cheers,
David

David Morgan | Environmental Planner + Conservation Agent | Department of Planning and Community Development | 781.316.3012

Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.

From: David White <dwhite@gilbertwhite.com>

Sent: Monday, September 18, 2023 10:08 AM

To: Johanna Meyer <meyer.jwm@gmail.com>; David Morgan <dmorgan@town.arlington.ma.us>; Miller, Stephan <steffmiller@mac.com>; George Stephans <gsfsjcb@verizon.net>

Subject: Fwd: WC Harvesting at the Res

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

All about the MyRWA WC harvesting at the Res this summer.

David

----- Forwarded Message -----

Subject: Re: WC Harvesting at the Res

Date: Mon, 18 Sep 2023 09:58:18 -0400

From: Daria Clark <daria.clark@mysticriver.org>

To: David White <dwhite@gilbertwhite.com>

Hi David,

Certainly! Here are some stats for you:

- How many events did MyRWA organize? **10 events**
- How many people participated? **200 volunteers**
- How many baskets of WC were collected? **1050 baskets**

Additionally, here are folders with photos from the events:

- (7/8 Community Event) https://drive.google.com/drive/folders/1Ouu19kQ-laeJw9GzCno8RC3zjkn7WJwH?usp=drive_link
- (7/21 Copley Wolf) <https://www.dropbox.com/scl/fo/ajune4zzicgbqjvwmstrq/h?rlkey=bzssd0gg8nfccai9xx42l6cyx&dl=0>
- (8/3 Community Event) <https://www.dropbox.com/scl/fo/otzq7x5qxia99k8gf7rbm/h?rlkey=37x6nim1webwucgruwpbnd70d&dl=0>
- (8/4 Bevi) <https://www.dropbox.com/scl/fo/m94h9e8w5l26qczrcrzpb/h?rlkey=gu92vlyynzk6k921xwskzja5n&dl=0>
- (8/22 Alexion Pharmaceuticals) <https://www.dropbox.com/scl/fo/00weh43nao1kjfshb48na/h?rlkey=iq5w07g9kvzs08u9yfe1eol77&dl=0>
- (8/23 Mathworks) <https://www.dropbox.com/scl/fo/rh72vv8yqs6vjcuo2i6cz/h?rlkey=beubaynp2w8nocpyoo4stsf4q&dl=0>
- (8/28 Tufts CORE Fellows) <https://www.dropbox.com/scl/fo/jeytc5yh6ui337rs4j7qh/h?rlkey=0664i99dnpuca5elultv55p51&dl=0>

Thanks David!! I'd love to see the annual report when it's finished :)

Best,
-Daria

On Sat, Sep 16, 2023 at 2:48 PM David White <dwhite@gilbertwhite.com> wrote:

Thanks Daria for organizing the water chestnut cleanups at the Arlington Res.

We'd like to know for our records and the annual report

- How many events did MyRWA organize?
- How many people participated?
- How many baskets of WC were collected?

Thanks,

David & Johanna

P.S. We might even get a picture of MyRWA's efforts in our annual report.

--

Daria Clark | she/her

Engagement Manager

[Mystic River Watershed Association](#)

[Lands of Massachusetts, Nipmuc and Pawtucket tribes](#)

20 Academy Street, Suite 306 | Arlington, MA 02476-6401

Office: 781-316-3438 | Mobile: 310-427-5441

[Twitter](#) | [Facebook](#) | [Instagram](#)



Large tire in Reservoir

Beth Melofchik <tankmadel@yahoo.com>

Mon 9/18/2023 12:58 PM

To: ConComm <ConComm@town.arlington.ma.us>; David White <dwhite@gilbertwhite.com>; Susan Chapnick <s.chapnick@comcast.net>

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi David,

I submitted the following request in the Town portal:

"Across from Reservoir Beach, in the Reservoir, on the South shore is a large tractor trailer size tire. It is located on shore adjacent to the boundary marker for: Lexington/Arlington with Dog rules. Not far from new Ann Leroyer bench.

Please remove the tire. Thank you."

I tried to send it to DPW but it was routed to Recreation Department. The Portal is rigid. Reservoir reverts to Reservoir Beach.

Tire was last seen on south shore of Reservoir.

Thanks, wanted you all in loop.

Beth Melofchik

Re: 43 Beverly Road

David Morgan <dmorgan@town.arlington.ma.us>

Wed 9/13/2023 9:28 AM

To: John Barrows <johnbarrows_pe@yahoo.com>

 1 attachments (465 KB)

43 Beverly Road Dock Administrative Approval.pdf;

Hi John,

All set, see the attached. Thanks!

Cheers,

David

David Morgan | Environmental Planner + Conservation Agent | Department of Planning and Community Development | 781.316.3012

Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.

From: John Barrows <johnbarrows_pe@yahoo.com>

Sent: Thursday, August 31, 2023 2:36 PM

To: David Morgan <dmorgan@town.arlington.ma.us>

Subject: Re: 43 Beverly Road

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi David,

Just checking to see if you've had a chance to look this over?

Thanks, John

John Barrows, P.E.

RESNET Rater # 8190532

Salem Village Consulting, LLC

Cell # 978-204-2390



On Monday, August 21, 2023 at 01:20:06 PM EDT, John Barrows <johnbarrows_pe@yahoo.com> wrote:

Hi David,

Attached for your review is the Administrative Review request for 43 Beverly Rd.

As we discussed the homeowner needs the negative determination to proceed with the Waterway permit for the existing floating dock.

Please let me know if you have any questions.

Thanks, John

John Barrows, P.E.

RESNET Rater # 8190532

Salem Village Consulting, LLC

Cell # 978-204-2390



Recent summary of Artificial Turf Hazards - Collaborative for Health & Environment (CHE)

Susan D. Chapnick <s.chapnick@comcast.net>

Wed 9/6/2023 12:38 PM

To: ConComm <ConComm@town.arlington.ma.us>

Cc: David Morgan <dmorgan@town.arlington.ma.us>; Chuck Tirone <ctirone@ci.reading.ma.us>; mikeg125@gmail.com <mikeg125@gmail.com>

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Communication to the Arlington Conservation Commission:

Please see this recent summary of Artificial Turf Field Hazards and Safer Alternatives, from CHE (Collaborative for Health & Environment):

<https://www.healthandenvironment.org/join-us/blog/playing-on-plastic-artificial-turf-hazards-and-safer-alternatives>

I am communicating this reference for future discussions of the Conservation Commission and for information for our representative to the Artificial Turf Study Committee.

Thank you.

Susan

Susan D. Chapnick, M.S.

Chair, Arlington Conservation Commission

s.chapnick@comcast.net

Re: McClennen No Mow

David Morgan <dmorgan@town.arlington.ma.us>

Tue 9/19/2023 3:57 PM

To: Joe Connelly <jconnelly@town.arlington.ma.us>; Michael Rademacher <MRademacher@town.arlington.ma.us>; Kevin Naughton <knaughton@town.arlington.ma.us>

Great, thanks all! I'll ask ConCom to pay for signage like we have at Hurd Field and work with Joe about installation.

Cheers,
David

David Morgan | Environmental Planner + Conservation Agent | Department of Planning and Community Development | 781.316.3012

Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.

From: Joe Connelly <jconnelly@town.arlington.ma.us>

Sent: Tuesday, September 19, 2023 3:46 PM

To: David Morgan <dmorgan@town.arlington.ma.us>; Michael Rademacher <MRademacher@town.arlington.ma.us>; Kevin Naughton <knaughton@town.arlington.ma.us>

Subject: Re: McClennen No Mow

That is fine with me!

Joseph Connelly, M.Ed.
Director of Recreation
Town of Arlington
781-316-3889
jconnelly@town.arlington.ma.us

Public Records Notice

Please be advised that pursuant to G.L. c. 4 sec. 7(26) email correspondence to and from public employees is considered a public record. Only where the content of an email falls within one of the stated exemptions within the law may the Town withhold documents or information.

From: David Morgan <dmorgan@town.arlington.ma.us>

Sent: Tuesday, September 19, 2023 3:43 PM

To: Michael Rademacher <MRademacher@town.arlington.ma.us>; Kevin Naughton <knaughton@town.arlington.ma.us>

Cc: Joe Connelly <jconnelly@town.arlington.ma.us>

Subject: Re: McClennen No Mow

Thanks, Mike and Kevin. It's Joe's property, so I want to give him a chance to chime in. As I understand, this is an old agreement we're getting back to, part of the permit conditions from when the ponds were built.

Cheers,

David

David Morgan | Environmental Planner + Conservation Agent | Department of Planning and Community Development | 781.316.3012

Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.

From: Michael Rademacher <MRademacher@town.arlington.ma.us>

Sent: Tuesday, September 19, 2023 2:23 PM

To: Kevin Naughton <knaughton@town.arlington.ma.us>

Cc: David Morgan <dmorgan@town.arlington.ma.us>

Subject: Re: McClennen No Mow

Kevin-

That is my understanding. I have included David Morgan (Conservation Agent) on this message to confirm.

Thanks

Michael Rademacher, P.E.

Director of Public Works

781-316-3101

Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.

From: Kevin Naughton <knaughton@town.arlington.ma.us>

Sent: Tuesday, September 19, 2023 12:18 PM

To: Michael Rademacher <MRademacher@town.arlington.ma.us>

Subject: Re: McClennen No Mow

Hey Mike,

I have not been informed about any of this. If this is indeed the plan going forward that is not an issue. I will give this outline to the mowing crew. Just to confirm, we are only going 10 feet off of the path?

Thanks,

Kevin



Kevin Naughton

Parks Division Supervisor

Town of Arlington | Department of Public Works

51 Grove St. Arlington, MA. 02476

(781) 316-3349 Phone | (781) 316-3309 Fax

From: Michael Rademacher <MRademacher@town.arlington.ma.us>
Sent: Tuesday, September 19, 2023 9:47 AM
To: Kevin Naughton <knaughton@town.arlington.ma.us>
Subject: Fw: McClennen No Mow

Kevin-

Attached is a map of the brook at the back of McClennen Park. Seem like we are supposed to make a portion of that area a "no mow" zone.

Are you aware of this? Seem like the plan is to only mow about 10 feet off the path in that area. Are you aware of this?

Let me know if you have any questions.

Thanks

Michael Rademacher, P.E.
Director of Public Works
781-316-3101

Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.

From: David Morgan <dmorgan@town.arlington.ma.us>
Sent: Tuesday, September 19, 2023 9:36 AM
To: Michael Rademacher <MRademacher@town.arlington.ma.us>
Cc: Joe Connelly <jconnelly@town.arlington.ma.us>
Subject: Re: McClennen No Mow

Thanks, Mike. The map I'm attaching is close to the original plan. I made it simpler. This way, we just mow 10 feet off the path and fence, leave the rest alone, except for maybe a couple access points.

Cheers,
David

David Morgan | Environmental Planner + Conservation Agent | Department of Planning and Community Development | 781.316.3012

Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.

From: Michael Rademacher <MRademacher@town.arlington.ma.us>
Sent: Tuesday, September 19, 2023 9:30 AM
To: David Morgan <dmorgan@town.arlington.ma.us>
Subject: Re: McClennen No Mow

I believe DPW mows McClennen. Can you forward to me the plan you have developed? I do not recall seeing the last iteration. I can review with staff.

Thanks

Michael Rademacher, P.E.
Director of Public Works
781-316-3101

Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.

From: David Morgan <dmorgan@town.arlington.ma.us>
Sent: Tuesday, September 19, 2023 9:28 AM
To: Joe Connelly <jconnelly@town.arlington.ma.us>; Michael Rademacher <MRademacher@town.arlington.ma.us>
Subject: Re: McClennen No Mow

Hi Joe and Mike,
I'm coming back to this after seeing that the area around McClennen has been mowed down again. Mike, is this DPW or a contractor doing the work?

Cheers,
David

David Morgan | Environmental Planner + Conservation Agent | Department of Planning and Community Development | 781.316.3012
Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.

From: David Morgan
Sent: Friday, May 12, 2023 10:53 AM
To: Joe Connelly <jconnelly@town.arlington.ma.us>; Michael Rademacher <MRademacher@town.arlington.ma.us>
Subject: McClennen No Mow

Hi Joe and Mike,
I took the no-mow concept at McClennen detention ponds back to the drawing board again to simplify it more. I understand that this was an old agreement, and I'm hoping we can revisit it.

Currently, McClennen is mowed right up to the edge of the pond. I'm proposing that we cut back to mowing to 10' off the shoulder of the path and fence. I've attached a diagram that shows what this would look like.

It'd be great to discuss this with you both. Can we touch base at the end of next week?

Cheers,
David

David Morgan | Environmental Planner + Conservation Agent | Department of Planning and Community Development | 781.316.3012
Arlington values equity, diversity, and inclusion. We are committed to building a community where everyone is heard, respected, and protected.



Town of Arlington, Massachusetts

Enforcement Order: 65 Dudley Street.

Summary:

Enforcement Order: 65 Dudley Street.

ATTACHMENTS:

	Type	File Name	Description
▢	Reference Material	65_Dudley_Street_Enforcement_Order_08242003.pdf	65 Dudley Street Enforcement Order



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 9 – Enforcement Order
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number: _____

A. Violation Information

Important:
When filling out
forms on the
computer, use
only the tab
key to move
your cursor -
do not use the
return key.



This Enforcement Order is issued by:

Arlington

Conservation Commission (Issuing Authority)

08/02/2023

Date

To:

ZHENG IRIS ZHAOYAN

Name of Violator

65 Dudley Street

Address

1. Location of Violation:

Property Owner (if different)

65 Dudley Street

Street Address

Arlington

City/Town

55-1

Assessors Map/Plat Number

02476

Zip Code

3A

Parcel/Lot Number

2. Extent and Type of Activity (if more space is required, please attach a separate sheet):

Unpermitted excavation, grading, and construction

B. Findings

The Issuing Authority has determined that the activity described above is in a resource area and/or buffer zone and is in violation of the Wetlands Protection Act (M.G.L. c. 131, § 40) and its Regulations (310 CMR 10.00), because:

- ☒ the activity has been/is being conducted in an area subject to protection under c. 131, § 40 or the buffer zone without approval from the issuing authority (i.e., a valid Order of Conditions or Negative Determination).



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 9 – Enforcement Order
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number: _____

B. Findings (cont.)

☐ the activity has been/is being conducted in an area subject to protection under c. 131, § 40 or the buffer zone in violation of an issuing authority approval (i.e., valid Order of Conditions or Negative Determination of Applicability) issued to:

Name

Dated

File Number

Condition number(s)

☐ The Order of Conditions expired on (date):

Date

☐ The activity violates provisions of the Certificate of Compliance.

☐ The activity is outside the areas subject to protection under MGL c.131 s.40 and the buffer zone, but has altered an area subject to MGL c.131 s.40.

☐ Other (specify):

C. Order

The issuing authority hereby orders the following (check all that apply):

☒ The property owner, his agents, permittees, and all others shall immediately cease and desist from any activity affecting the Buffer Zone and/or resource areas.

☐ Resource area alterations resulting from said activity shall be corrected and the resource areas returned to their original condition.

☐ A restoration plan shall be filed with the issuing authority on or before

Date

for the following:

The restoration shall be completed in accordance with the conditions and timetable established by the issuing authority.
--



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 9 – Enforcement Order
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number: _____

C. Order (cont.)

- ☐ Complete the attached Notice of Intent (NOI). The NOI shall be filed with the Issuing Authority on or before:

Date

for the following:

No further work shall be performed until a public hearing has been held and an Order of Conditions has been issued to regulate said work.

- ☒ The property owner shall take the following action (e.g., erosion/sedimentation controls) to prevent further violations of the Act:

Cease all work on the driveway expansion and retaining walls.

Submit a Request for Determination of Applicability (WPA Form 1) detailing the driveway expansion, retaining walls, and planting of two native trees within the front yard subject to Section 25 of the Arlington Regulations for Wetlands Protection. Monitor and control site for erosion as needed.

Attend the 09/21/2023 7:00 PM meeting of the Arlington Conservation Commission to present the Request for Determination of Applicability.

Failure to comply with this Order may constitute grounds for additional legal action. Massachusetts General Laws Chapter 131, Section 40 provides: "Whoever violates any provision of this section (a) shall be punished by a fine of not more than twenty-five thousand dollars or by imprisonment for not more than two years, or both, such fine and imprisonment; or (b) shall be subject to a civil penalty not to exceed twenty-five thousand dollars for each violation". Each day or portion thereof of continuing violation shall constitute a separate offense.

D. Appeals/Signatures

An Enforcement Order issued by a Conservation Commission cannot be appealed to the Department of Environmental Protection, but may be filed in Superior Court.

Questions regarding this Enforcement Order should be directed to:

David Morgan

Name

781-316-3012

Phone Number

M-W 8-4, Th 8-7, F 8-12

Hours/Days Available

Issued by:

Arlington

Conservation Commission

Conservation Commission signatures required on following page.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 9 – Enforcement Order
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number: _____

D. Appeals/Signatures (cont.)

In a situation regarding immediate action, an Enforcement Order may be signed by a single member or agent of the Commission and ratified by majority of the members at the next scheduled meeting of the Commission.

Signatures:

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature of delivery person or certified mail number



Town of Arlington, Massachusetts

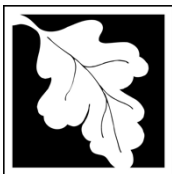
Enforcement Order: 451 and 455 Mystic Street.

Summary:

Enforcement Order: 451 and 455 Mystic Street.

ATTACHMENTS:

	Type	File Name	Description
▢	Reference Material	451- 455_Mystic_Street_Enforcement_Order.pdf	451-455 Mystic Street Enforcement Order



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 9 – Enforcement Order
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number: _____

A. Violation Information

Important:

When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



This Enforcement Order is issued by:

Arlington

Conservation Commission (Issuing Authority)

08/02/2023

Date

To:

Chuck Chandler

Name of Violator

455 Mystic Street

Address

1. Location of Violation:

Property Owner (if different)

451 and 455 Mystic Street

Street Address

Arlington

City/Town

78-1

Assessors Map/Plat Number

02476

Zip Code

1

Parcel/Lot Number

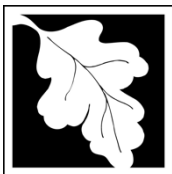
2. Extent and Type of Activity (if more space is required, please attach a separate sheet):

Unpermitted excavation, grading, and construction

B. Findings

The Issuing Authority has determined that the activity described above is in a resource area and/or buffer zone and is in violation of the Wetlands Protection Act (M.G.L. c. 131, § 40) and its Regulations (310 CMR 10.00), because:

- ☒ the activity has been/is being conducted in an area subject to protection under c. 131, § 40 or the buffer zone without approval from the issuing authority (i.e., a valid Order of Conditions or Negative Determination).



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 9 – Enforcement Order
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number: _____

B. Findings (cont.)

☐ the activity has been/is being conducted in an area subject to protection under c. 131, § 40 or the buffer zone in violation of an issuing authority approval (i.e., valid Order of Conditions or Negative Determination of Applicability) issued to:

Name

Dated

File Number

Condition number(s)

☐ The Order of Conditions expired on (date):

Date

☐ The activity violates provisions of the Certificate of Compliance.

☐ The activity is outside the areas subject to protection under MGL c.131 s.40 and the buffer zone, but has altered an area subject to MGL c.131 s.40.

☐ Other (specify):

C. Order

The issuing authority hereby orders the following (check all that apply):

☒ The property owner, his agents, permittees, and all others shall immediately cease and desist from any activity affecting the Buffer Zone and/or resource areas.

☐ Resource area alterations resulting from said activity shall be corrected and the resource areas returned to their original condition.

☐ A restoration plan shall be filed with the issuing authority on or before

Date

for the following:

The restoration shall be completed in accordance with the conditions and timetable established by the issuing authority.
--



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 9 – Enforcement Order
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number: _____

C. Order (cont.)

- ☐ Complete the attached Notice of Intent (NOI). The NOI shall be filed with the Issuing Authority on or before:

Date

for the following:

No further work shall be performed until a public hearing has been held and an Order of Conditions has been issued to regulate said work.

- ☒ The property owner shall take the following action (e.g., erosion/sedimentation controls) to prevent further violations of the Act:

Attend the 09/21/2023 7:00 PM meeting of the Arlington Conservation Commission, remove all equipment from the jurisdictional areas, establish erosion controls of a biodegradable 12" mulch sock at the limit of work and additional protections as directed by the Conservation Agent

Failure to comply with this Order may constitute grounds for additional legal action. Massachusetts General Laws Chapter 131, Section 40 provides: "Whoever violates any provision of this section (a) shall be punished by a fine of not more than twenty-five thousand dollars or by imprisonment for not more than two years, or both, such fine and imprisonment; or (b) shall be subject to a civil penalty not to exceed twenty-five thousand dollars for each violation". Each day or portion thereof of continuing violation shall constitute a separate offense.

D. Appeals/Signatures

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Questions regarding this Enforcement Order should be directed to:

David Morgan

Name

781-316-3012

Phone Number

M-W 8-4, Th 8-7, F 8-12

Hours/Days Available

Issued by:

Arlington

Conservation Commission

Conservation Commission signatures required on following page.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 9 – Enforcement Order
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number: _____

D. Appeals/Signatures (cont.)

In a situation regarding immediate action, an Enforcement Order may be signed by a single member or agent of the Commission and ratified by majority of the members at the next scheduled meeting of the Commission.

Signatures:

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature

Printed Name

Signature of delivery person or certified mail number



Town of Arlington, Massachusetts

Request for Permit Amendment: 88 Coolidge Road.

Summary:

Request for Permit Amendment: 88 Coolidge Road.

ATTACHMENTS:

Type	File Name	Description
▢ Reference Material	Nobis_091923_Notes_on_Trudeau_Response_1_083123_final.pdf	Nobis Group Notes on 88 Coolidge Proposal
▢ Reference Material	Nobis_Group_Comments_on_88_Coolidge_Foundation_Plan_with_Drainage.pdf	Nobis Group Comments on 88 Coolidge Foundation Plan with Drainage

on

Mary Trudeau
Wetlands Consultant
141 Lowell Street
Lexington, Massachusetts 02420

781-424-4768
marytrudeau@ymail.com

August 31, 2023

Arlington Conservation Commission
Town Hall
Arlington, MA

Re: 88 Coolidge Road, Arlington, MA
Amendment to Order of Conditions (91-278)

To the Commission:

Please find the attached responses to the initial comments generated by the Nobis review of the proposed amendment to the Order of Conditions for 88 Coolidge Road. These responses were prepared by Chad Smurtzer, PE (Structural Engineer); Alfred Taney, PE (Geotechnical Engineer); Albert Gala, PE (Civil Engineer).

Question 1: Regarding the AAT Letter report dated 2/14/23: The applicant recommends cleaning the bedrock and then pinning the house foundation to the bedrock. What does “cleaning” entail? Does this involve actual removal of rock? What is your engineer's professional opinion on the likelihood that such cleaning might release confined water flow from the top surface or shallow fractures in the rock, causing upwelling of water?

The process of pinning requires drilling holes into the rock, which will create dust and small debris, which must be cleaned away from the surface of the bedrock—this is the cleaning referred to in the requested amendment. The cleaning could be performed with a garden hose to remove loose dirt so the rock surface can be observed where pinning will occur. The likelihood of the cleaning process causing upwelling is unlikely since the process can be performed with low pressure garden hoses or brushes and buckets of water. High pressure power washing is not recommended.

Nobis Note: *Nobis recommends accepting this response.*

Question 2: Regarding the Foundation Plan by C. Smutzer, P.E., dated 1/13/23, the notes in the center of the drawing state that the foundation is “assumed to rest entirely on bedrock.” The top surface of the bedrock at the site is known to be very irregular. This means that significant bedrock removal would be needed to accomplish this. Do you agree with this conclusion?

No—foundations are often poured on irregular bedrock—that is the reason for the pinning requirement to allow the foundation to be poured on irregular or sloped bedrock. The bedrock does not have to be flat. The bedrock must be stable, however, and all loose or shattered material must be removed.

Nobis Note: *Nobis’ July 24, 2017 letter report to the Town of Arlington noted (pg 4 & pg 11) that six test holes at the site reached “refusal” at depths ranging from 30 to 63 inches. The Nobis report further noted that “refusal” does not necessarily mean that the top of bedrock was reached (could be deeper). Nobis concluded, at that time, that “a degree of uncertainty in the configuration of the bedrock surface is still present.” Nobis now recommends that the Town ask the following questions:*

1. *Have there been any alterations to the top of the bedrock surface since 2017?*
2. *Is there any new information (borings, test pits, other observations) regarding the three-dimensional configuration of the bedrock surface, acquired since 2017?*
3. *Based on answers to these two questions, does the Applicant believe that a foundation can be poured on the irregular bedrock at 88 Coolidge, as the bedrock surface is currently configured and characterized?*

Question 3: Regarding the same drawing, AAT mention “cleaning” of bedrock but not removal. Is the foundation resting entirely on bedrock consistent with what is proposed by AAT? What risks might be posed by removing significant amounts of bedrock; might this cause groundwater upwelling?

From a structural standpoint, only the loose bedrock is required to be removed—it does not have to be level but is required to be stable with no shattered material. It is my understanding that no more intact/competent rock will be removed and therefore it is unlikely that upswelling will occur.

Nobis Note: *Nobis suggests that the Town ask the following questions:*

4. *Can the Applicant confirm, considering the answer to the questions above, that no more intact/competent rock will be removed?*
5. *Has the Applicant made observations after large rain or snowmelt events that confirm that no upwelling of water occurs at the site under current conditions?*

Question 4: Regarding the March 19, 2023 letter from Mary Trudeau, Wetland Consultant, how do you know how deep the weathered, poor quality bedrock in the southwest corner of the proposed foundation extends?

While this cannot be definitively answered without the removal of the loose and or weathered/cracked portions of the surficial ledge, and the subsequent exposure of stable bedrock, the intent is to remove limited amounts of weathered stone. Often the bedrock stabilizes below grade as it is the exposure to weather which can cause the loosening and cleavage. Based on our initial visual assessment, the amount of material to be removed is estimated at a cubic yard.

Nobis Note:

6. *Is support of excavation (e.g. sheet piling) anticipated to excavate to top of competent bedrock?*

7. *Based on the Foundation Plans, dated 1/13/2023, Gravel Base is required below the proposed concrete slab. What is the minimum thickness of Gravel Base below the slab? If bedrock is locally shallow in the area of the slab, what is the plan for removal of bedrock?*

Question 5: What if you have to extend the excavation deeper than the intended grade? Will you then remove more bedrock to lower a larger area down to the southwest corner's grade or will you emplace fill in the low area to even out the excavation? If so, how will this affect drainage?

If the bedrock removal needs to go below grade, engineered fill can be used to backfill the work area. We are looking for either a level surface or stable bedrock to ensure a solid foundation. It is our understanding that no more intact rock removal will occur, and that the removal of weathered or exposed ledge will be the extent of the alterations. The drainage installed on the property to control hydrostatic pressures and runoff shall be designed by the Site Civil Engineer.

Nobis Note: *Nobis recommends that the Town should be provided with an opportunity to review the drainage design by the Site Civil Engineer.*

Based on the Foundation Plan, dated 1/13/2023, the foundation is assumed to rest entirely on bedrock. The above response appears to indicate that portions of the footing can be placed over engineered fill. Confirm if portions of the footing can be placed over engineered fill. Typically, placing a portion of a footing on bedrock and a portion over fill has the potential to result in undesirable differential settlement.

Question 6: In the AAT letter (2/14/23), AAT recommends that pinning the foundation to bedrock should be conditioned on inclusion of a foundation drain system to be designed by a Civil Engineer. Mary, do you agree with AAT's recommendation? Can you please explain who on the team will be designing the foundation drain?

A perimeter drain around the foundation will be required as per the building code, and designed by a Registered Professional Engineer. The perimeter drain will connect the outflow water from the subsurface drainage systems, at different elevations and route it to a new area of crushed stone below the deck/patio. It is expected the pinned foundation walls will have below surface weep holes to allow drainage from behind the walls to drain into the perimeter drain.

Nobis Note: *Nobis recommends that the Town accept this response but be provided with an opportunity to review the drainage design by the Site Civil Engineer.*

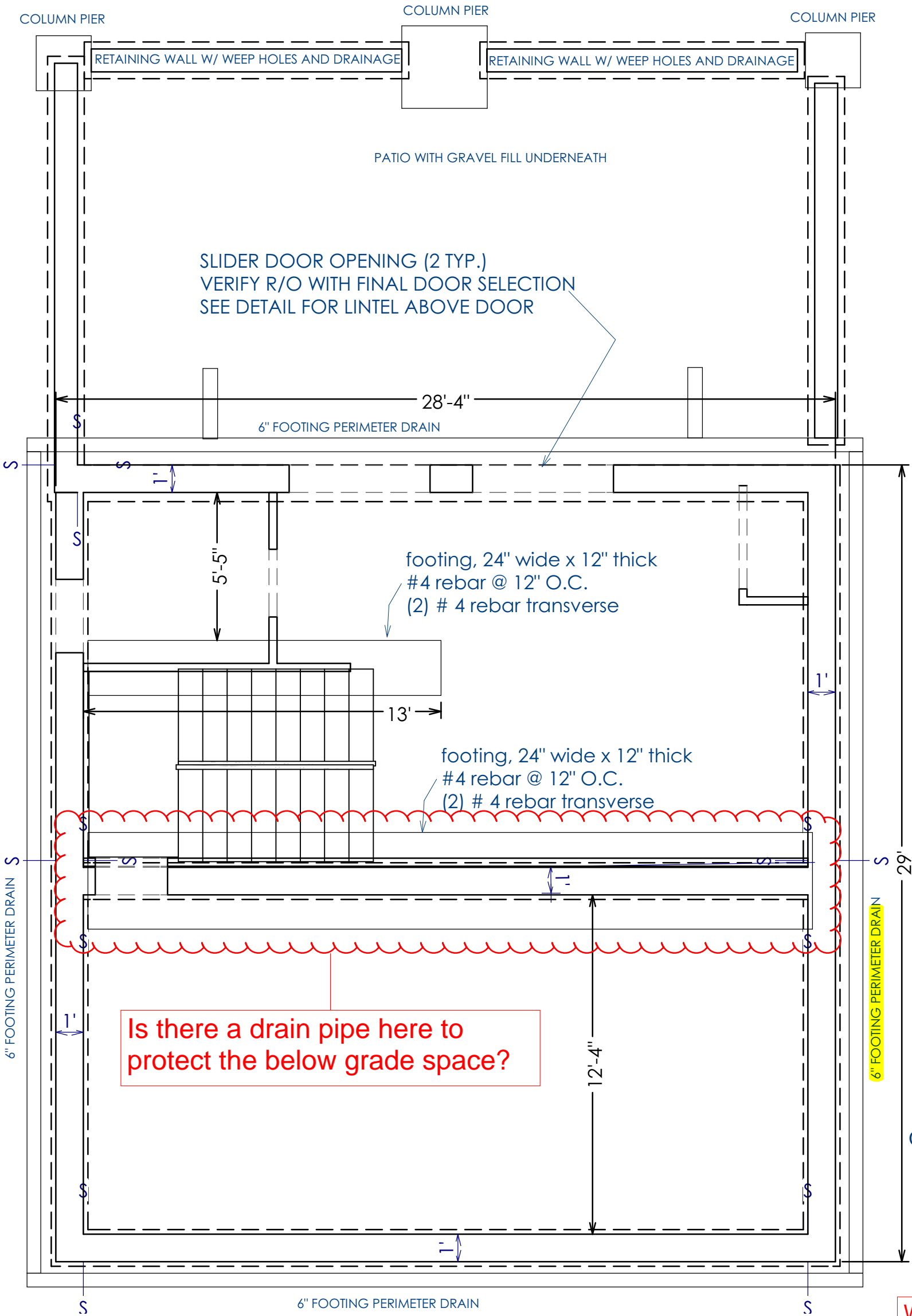
Thank you for the opportunity to respond to the Nobis comments. Feel free to contact me with any questions.

Sincerely,

A handwritten signature in purple ink that reads "Mary Trudeau". The signature is written in a cursive, flowing style.

Mary Trudeau, Wetlands Consultant

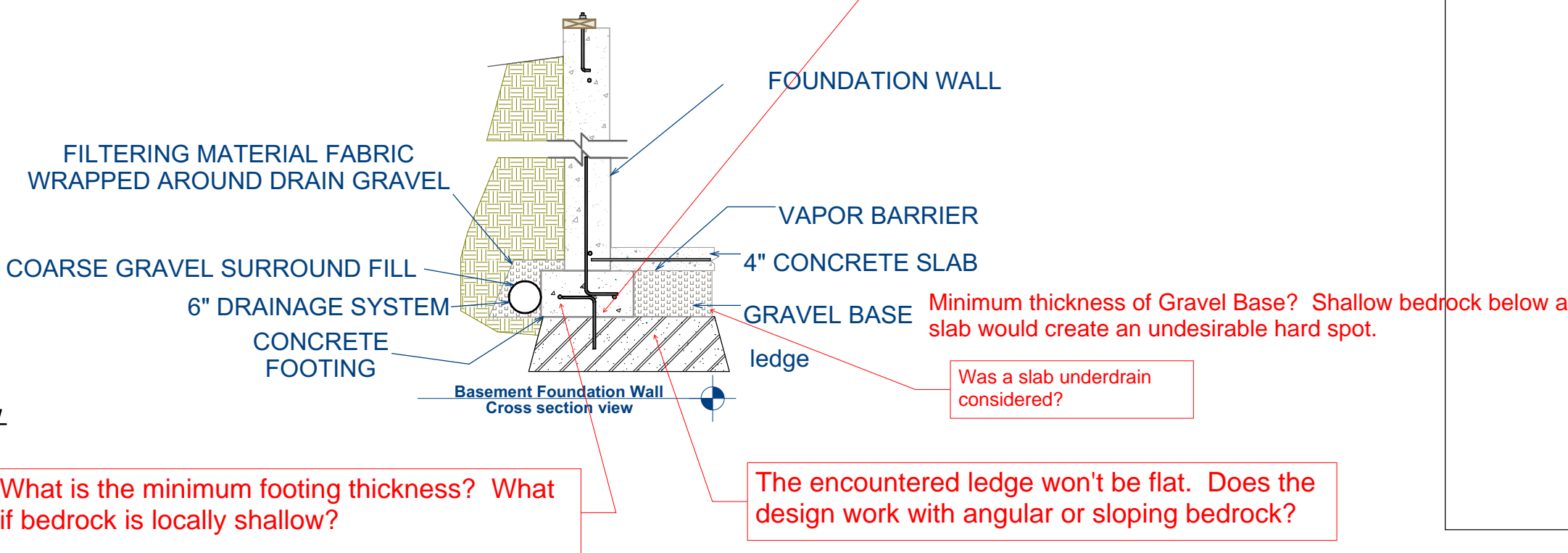
RETAINING WALL ASSUMED TO REST ENTIRELY ON BEDROCK--CONTACT ENGINEER IF DIFFERENT
CLEAN ROCK AND APPLY BONDING AGENT
DRILL ROCK WITH 1" DRILL WITH MIN 12" EMBEDMENT
CLEAN HOLES WITH COMPRESSED AIR
INSERT #6 REBAR @ 24" O.C. & EPOXY INTO HOLES
REBAR TO HAVE MIN 12" EMBEDMENT INTO WALLS, 90 DEG. HOOK AT END
4,000 PSI CONCRETE



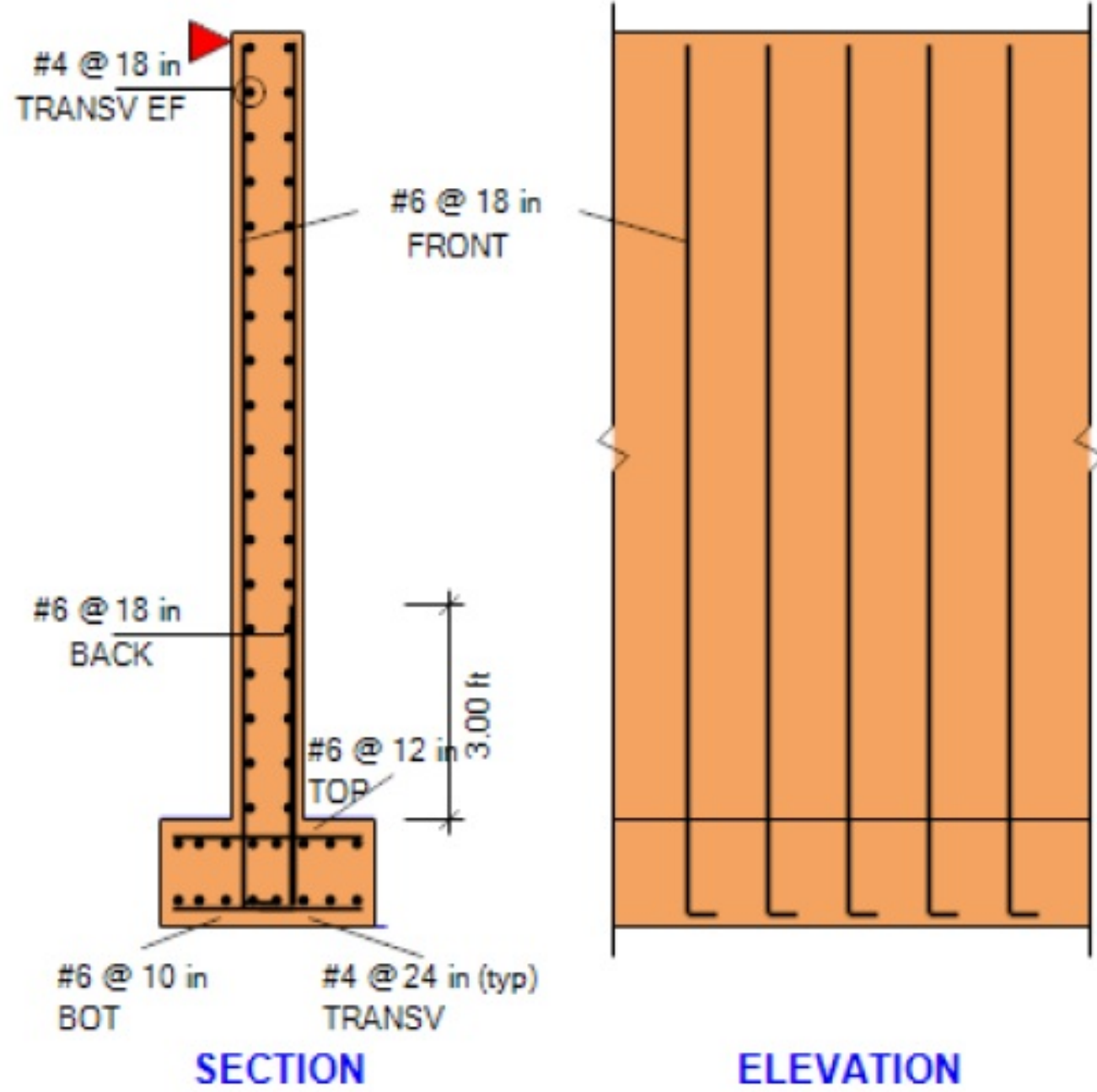
FOUNDATION PLAN

FOUNDATION ASSUMED TO REST ENTIRELY ON BEDROCK--CONTACT ENGINEER IF DIFFERENT
CLEAN ROCK AND APPLY BONDING AGENT
DRILL ROCK WITH 1" DRILL WITH MIN 12" EMBEDMENT
CLEAN HOLES WITH COMPRESSED AIR
INSERT #6 REBAR @ 48" O.C. & EPOXY INTO HOLES
REBAR TO HAVE MIN 12" EMBEDMENT INTO WALLS, 90 DEG. HOOK AT END

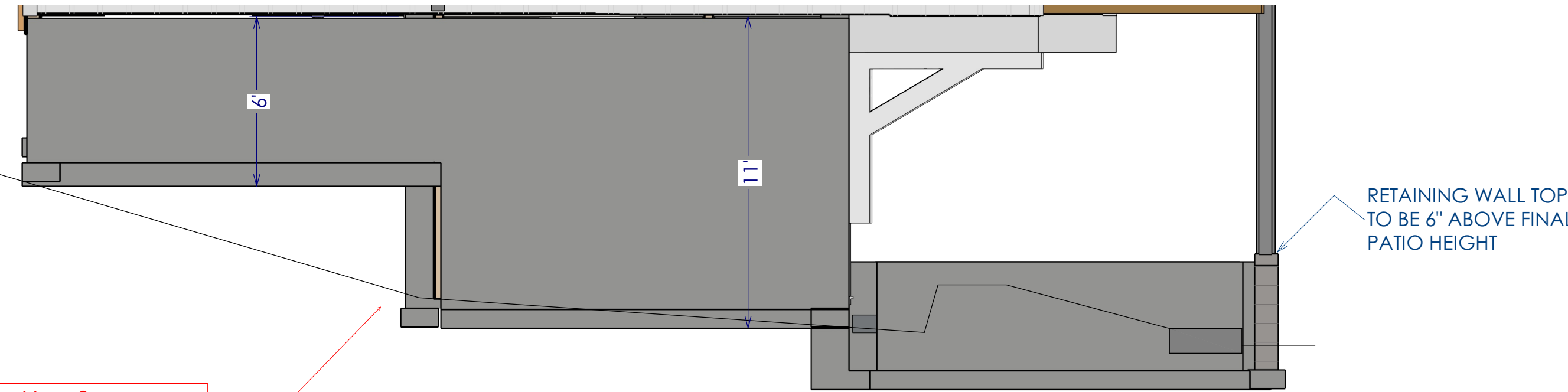
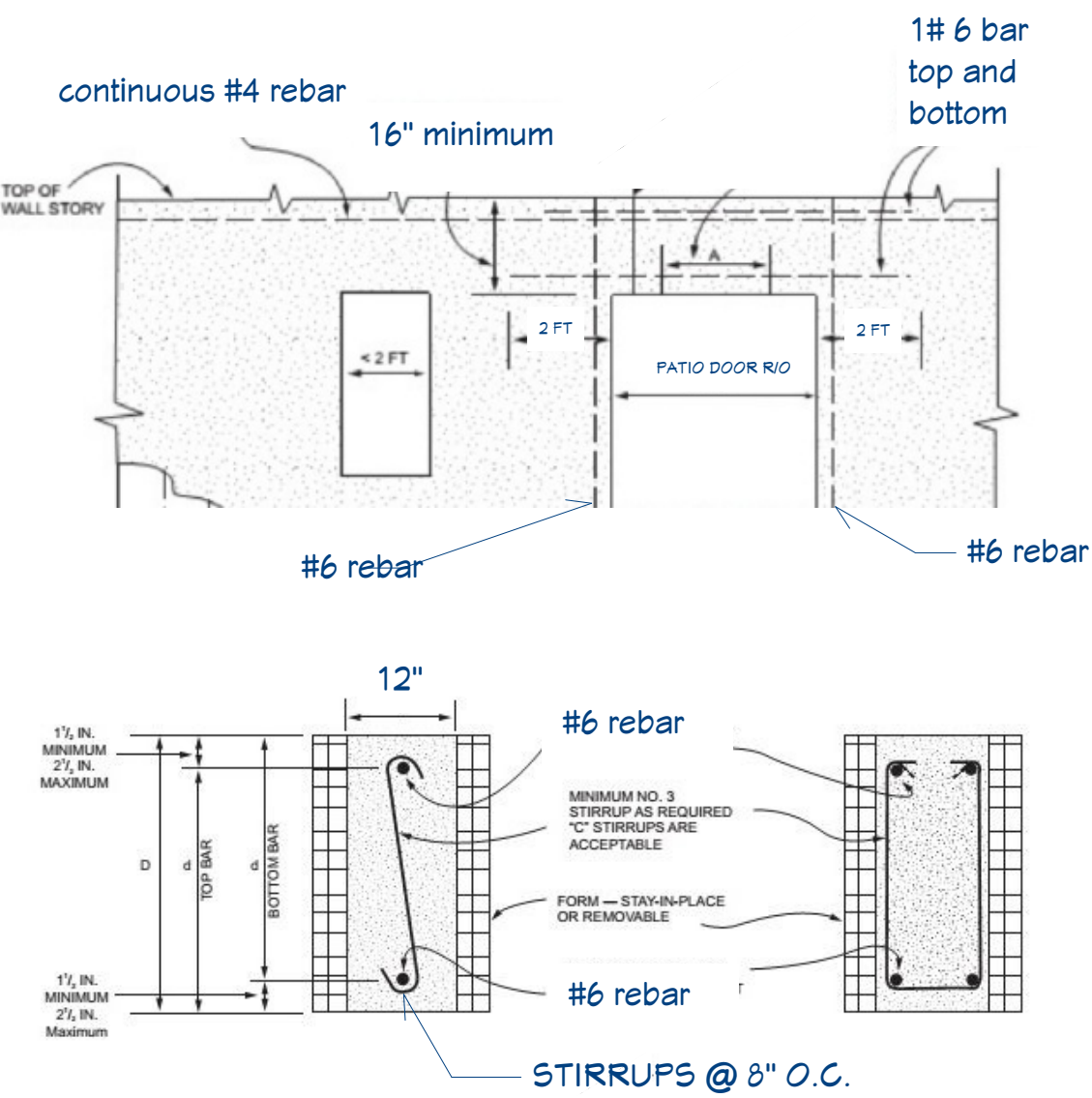
Six foot basement wall rebar:
vertical reinforcement: #6 @ 34"
horizontal reinforcement: # 4 @ 1', 3', 5'
see detail for 11' tall wall rebar



11 FOOT TALL CONCRETE WALL REBAR DETAIL



PATIO DOOR LINTEL DETAIL (2 TYP.)



Foundation elevation view

REVISION TABLE		REVISION BY	DESCRIPTION
NUMBER	DATE		

88 Coolidge
Arlington, MA

DRAWINGS PROVIDED BY:
C. SMUTZER, PE
PO BOX 732
WESTFORD, MA 01886

DATE:

1/13/2023

SCALE:

SHEET:

S101



Town of Arlington, Massachusetts

Request for Determination of Applicability: 65 Dudley Street.

Summary:

Request for Determination of Applicability: 65 Dudley Street.

The Conservation Commission will hold a public hearing to consider a Request for Determination of Applicability for the expansion of a driveway and construction of a retaining wall at 65 Dudley Street in Arlington.

ATTACHMENTS:

	Type	File Name	Description
▢	Reference Material	65_Dudley_Street_RDA.pdf	65 Dudley Street RDA Package



Massachusetts Department of Environmental Protection
Bureau of Water Resources - Wetlands

WPA Form 1- Request for Determination of Applicability

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Town of
Arlington
Municipality

A. General Information

Important:

When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. Applicant:

Iris

Zheng

First Name

Last Name

65 Dudley St

Address

Arlington

MA

02476

City/Town

State

Zip Code

347.863.2076

Phone Number

Email Address

2. Property Owner (if different from Applicant):

First Name

Last Name

Address

City/Town

State

Zip Code

Phone Number

Email Address (if known)

3. Representative (if any)

First Name

Last Name

Company Name

Address

City/Town

State

Zip Code

Phone Number

Email Address (if known)

B. Project Description

1. a. Project Location (use maps and plans to identify the location of the area subject to this request):

65 Dudley Street

Arlington, MA

Street Address

City/Town

42142

16781

Latitude (Decimal Degrees Format with 5 digits after decimal e.g. XX.XXXXX)

Longitude (Decimal Degrees Format with 5 digits after decimal e.g. -XX.XXXXX)

055.0

0001-0003.A

Assessors' Map Number

Assessors' Lot/Parcel Number

b. Area Description (use additional paper, if necessary):

c. Plan and/or Map Reference(s): (use additional paper if necessary)

Title

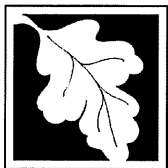
Date

Title

Date

[How to find Latitude and Longitude](#)

[and how to convert to decimal degrees](#)



Massachusetts Department of Environmental Protection
Bureau of Water Resources - Wetlands

WPA Form 1- Request for Determination of Applicability

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Town of
Arlington
Municipality

B. Project Description (cont.)

2. a. Activity/Work Description (use additional paper and/or provide plan(s) of Activity, if necessary):

Repair Retaining Walls, stairs and walkway to home, and expand driveway from 11 to 20 Feet. In addition, will plant 2 native trees within the front yard.

- b. Identify provisions of the Wetlands Protection Act or regulations which may exempt the applicant from having to file a Notice of Intent for all or part of the described work (use additional paper, if necessary).

3. a. If this application is a Request for Determination of Scope of Alternatives for work in the Riverfront Area, indicate the one classification below that best describes the project.

- ☐ Single family house on a lot recorded on or before 8/1/96
- ☐ Single family house on a lot recorded after 8/1/96
- ☐ Expansion of an existing structure on a lot recorded after 8/1/96
- ☐ Project, other than a single-family house or public project, where the applicant owned the lot before 8/7/96
- ☐ New agriculture or aquaculture project
- ☐ Public project where funds were appropriated prior to 8/7/96
- ☐ Project on a lot shown on an approved, definitive subdivision plan where there is a recorded deed restriction limiting total alteration of the Riverfront Area for the entire subdivision
- ☐ Residential subdivision; institutional, industrial, or commercial project
- ☐ Municipal project
- ☐ District, county, state, or federal government project
- ☐ Project required to evaluate off-site alternatives in more than one municipality in an Environmental Impact Report under MEPA or in an alternatives analysis pursuant to an application for a 404 permit from the U.S. Army Corps of Engineers or 401 Water Quality Certification from the Department of Environmental Protection.

- b. Provide evidence (e.g., record of date subdivision lot was recorded) supporting the classification above (use additional paper and/or attach appropriate documents, if necessary.)



Massachusetts Department of Environmental Protection
Bureau of Water Resources - Wetlands

WPA Form 1- Request for Determination of Applicability

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Town of
Arlington
Municipality

C. Determinations

1. I request the _____ make the following determination(s). Check any that apply:

Conservation Commission

- ☐ a. whether the **area** depicted on plan(s) and/or map(s) referenced above is an area subject to jurisdiction of the Wetlands Protection Act.
- ☐ b. whether the **boundaries** of resource area(s) depicted on plan(s) and/or map(s) referenced above are accurately delineated.
- ☒ c. whether the **Activities** depicted on plan(s) referenced above is subject to the Wetlands Protection Act and its regulations.
- ☒ d. whether the area and/or Activities depicted on plan(s) referenced above is subject to the jurisdiction of any **municipal wetlands' ordinance** or **bylaw** of:

Name of Municipality

- ☐ e. whether the following **scope of alternatives** is adequate for Activities in the Riverfront Area as depicted on referenced plan(s).

D. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Request for Determination of Applicability and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge.

I further certify that the property owner, if different from the applicant, and the appropriate DEP Regional Office were sent a complete copy of this Request (including all appropriate documentation) simultaneously with the submittal of this Request to the Conservation Commission.

Failure by the applicant to send copies in a timely manner may result in dismissal of the Request for Determination of Applicability.

Signatures:

I also understand that notification of this Request will be placed in a local newspaper at my expense in accordance with Section 10.05(3)(b)(1) of the Wetlands Protection Act regulations.

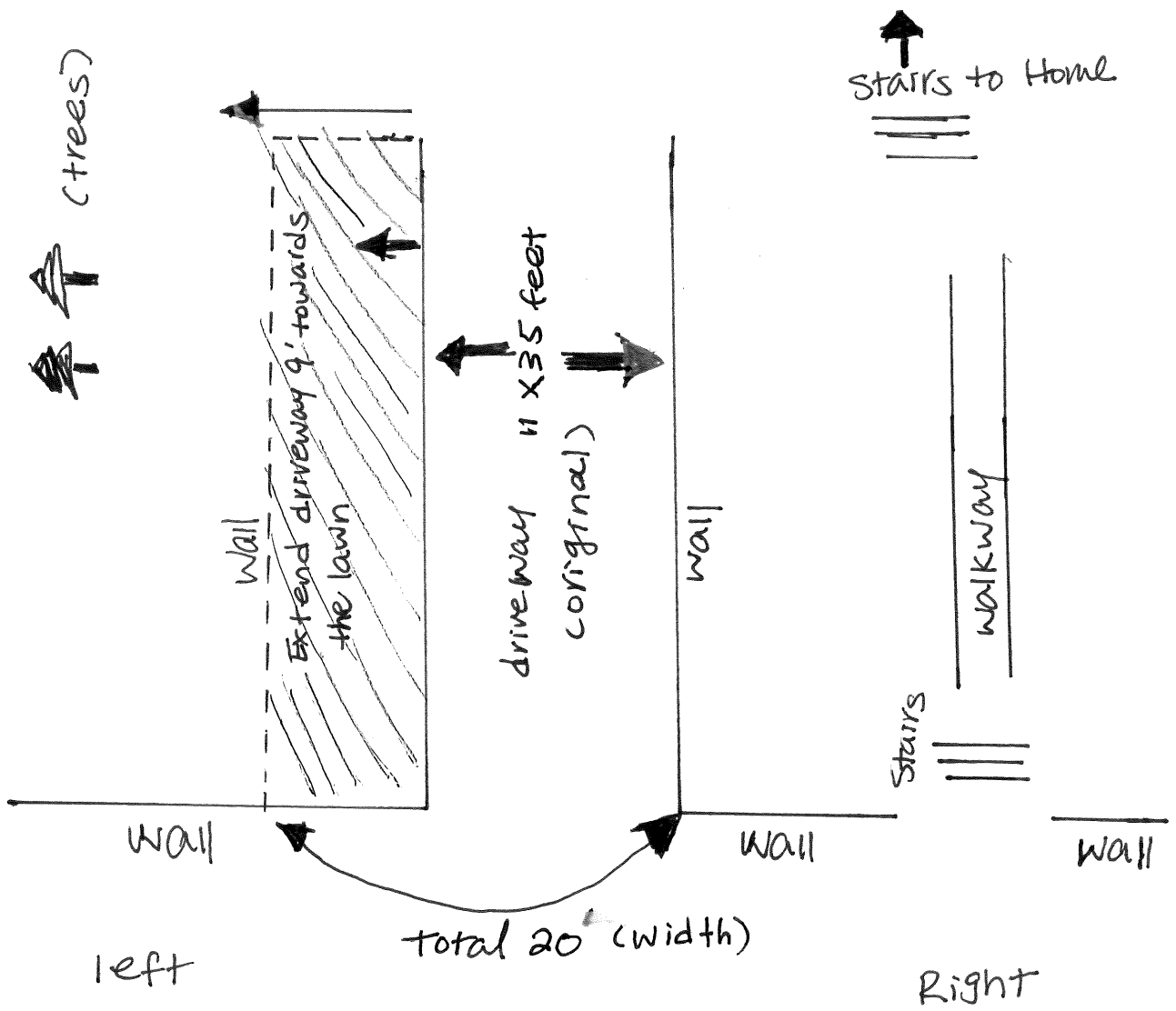
Signature of Applicant

Date

8/30/2023

Signature of Representative (if any)

Date



**CERTIFIED ABUTTERS LIST**

Date: August 24, 2023

Subject Property Address: 65 DUDLEY ST Arlington, MA

Subject Property ID: 55-1-3.A

Search Distance: 100 Feet - Conservation

Parcel ID:	Property Location	Owner 1	Owner 2	MAILING ADDRESS			
				Mailing Address 1	Town	State	Zip
79-A-3-51.2	51 BRATTLE ST UNIT 2	51 BRATTLE STREET LLC		49 BRATTLE ST	ARLINGTON	MA	02474
79-A-3-49.1	49 BRATTLE ST UNIT 1	49 BRATTLE STREET LLC		49 BRATTLE ST	ARLINGTON	MA	02474
55-1-1.B	75 DUDLEY ST	A & V DUDLEY STREET LLC		60 BUCKMASTER DRIVE	CONCORD	MA	01742
55-1-2	67 DUDLEY ST	BOUDREAU BARBARA	LIFE ESTATE	67 DUDLEY ST	ARLINGTON	MA	02476
55-1-3.A	65 DUDLEY ST	ZHENG IRIS ZHAOYAN		65 DUDLEY ST	ARLINGTON	MA	02476
55-1-3.B	61 DUDLEY ST	SANTINI REALTY LLC		60 DUDLEY ST	ARLINGTON	MA	02476
55-1-4	57 DUDLEY ST	FINOCHETTI JOHN		55R DUDLEY ST	ARLINGTON	MA	02476
55-2-29.A	76 DUDLEY ST	LYNCH FRANCIS/BEATRICE/L EST		76 DUDLEY ST	ARLINGTON	MA	02476
55-2-30.A	66 DUDLEY ST	CASTELLUCCIO R/LORUSSO S	TRS/THE S & R REALTY TRUST	3 LIDO AVE	BURLINGTON	MA	01803
55-2-30.B	60 DUDLEY ST	SANTINI MARK & GARY--TRS	SANTINI REALTY TR	60 DUDLEY ST	ARLINGTON	MA	02476
55-2-31.A	54-56 DUDLEY ST	FARRELL DANIEL/TRUSTEE	MARINO MARY F/TRUSTEE	52 DUDLEY ST	ARLINGTON	MA	02476
79-3-1.A	0-LOT BRATTLE ST	A & V DUDLEY STREET LLC		60 BUCKMASTER DRIVE	CONCORD	MA	01742
79-3-5.A	1-C BRATTLE DR	NOSTALGIA PROPERTIES LLC		39 BRIGHTON AVE	BOSTON	MA	02134

The Board of Assessors certifies the names and addresses of requested parties in interest, all abutters to a single parcel within 100 feet.

Town of Arlington

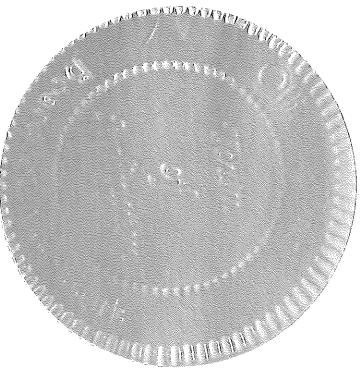
Office of the Board of Assessors

730 Massachusetts Ave

Arlington, MA 02476

P: 781.316.3050

E: assessors@town.arlington.ma.us



abutter list request

Iris Zheng <izheng@town.arlington.ma.us>

Thu 8/24/2023 5:23 PM

To:Jennifer O'Rourke <jorourke@town.arlington.ma.us>

Hi Jenny,

Could you please provide a list of abutters for my property? I need this for conservation commission. Thank you!

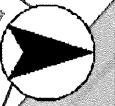
My property is:

**65 Dudley Street
Arlington, MA 021476**

Thank you,

Iris Zheng
Town of Arlington
Comptroller Office
27 Maple St. Room 202
Arlington, MA 02476
781-316-3336
izheng@town.arlington.ma.us

RECEIVED
TOWN OF ARLINGTON
2023 AUG 24 PM 5:54
OFFICE OF
ASSESSORS



- Places by Category
- Police Station
 - Fire Station
 - School
 - Library
 - Public Works
 - Recreation - Facilities
 - Recreation - Fields Courts
 - Recreation - Fields Courts
 - Open Space: Conservation
 - Open Space - Minuteman Bikeway
 - Open Space - Labels
 - Open Space
 - MA Highways
 - US Highway
 - Interstate
 - Numbered Routes
 - Abutting Towns
 - Town Boundary
 - Parcels
 - Buildings
 - Cemetery - Roads
 - Road1
 - Road2
 - Road3
 - Road4
 - Pavement Markings
 - Impervious Surface - For B
 - Street
 - Sidewalk
 - Driveway
 - Parking Lot
 - Roads - For Large Scale (1/4")
 - Roads - For Small Scale (1/8")
 - Major Road
 - Local Road
 - Master Plan Base Map - M
 - Water Line
 - Water Body

The data shown on this site are provided for informational and planning purposes only. The Town and its consultants are not responsible for the misuse or misrepresentation of the data.

0 120 240 ft

Printed on 08/24/2023 at 06:01 PM

ABUTTER NOTIFICATION

Notification to Abutters Under the Massachusetts Wetlands Protection Act and Arlington Wetlands Protection Bylaw

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the Arlington Wetlands Protection Bylaw, you are hereby notified of the following:

The Conservation Commission will hold a virtual public meeting using Zoom, on September 21, 2023 at 7:00 PM in accordance with the provisions of the Mass. Wetlands Protection Act (M.G.L. Ch. 131, s. 40, as amended), the Town of Arlington Bylaws Article 8, Bylaw for Wetland Protection, and in accordance with the Governor's Order Suspending Certain Provisions of the Open Meeting Law, G. L. c. 30A, § 20 relating to the COVID-19 emergency, for a Request for Determination of Applicability from Iris Zheng, for Retaining Wall and Driveway at 65 Dudley Street within 200 feet of a Riverfront, on Assessor's Property Map/s #55, Lot/s #1-3A. Please refer to the Commission's online meeting agenda for specific Zoom meeting access information.

A copy of the application and accompanying plans are available by request by contacting the Arlington Conservation at 781-316-3012 or concomm@town.arlington.ma.us. For more information, call the applicant, the Arlington Conservation Commission (781-316-3012), or the DEP Northeast Regional Office (978-694-3200).

NOTE: Notice of the Public Hearing will be published at least five (5) business days in advance in *The Arlington Advocate* and will also be posted at least 48 hours in advance in the Arlington Town Hall.

AFFIDAVIT OF SERVICE

I, *Iris Zheng*, being duly sworn, do hereby state as follows: on *August 28th 2023*, I mailed a "Notification to Abutters" in compliance with the second paragraph of Massachusetts General Laws, Chapter 131, s.40, the DEP Guide to Abutter Notification dated April 8, 1994, and the Arlington Wetlands Protection Bylaw, Title V, Article 8 of the Town of Arlington Bylaws in connection with the following matter:

Repair Retaining Walls, stairs and walkway to home, and expand driveway from 11 to 20 Feet. In addition, will plant 2 native trees within the front yard.

65 Dudley Street Arlington, MA 02476

The form of the notification, and a list of the abutters to whom it was provided and their addresses, are attached to this Affidavit of Service.

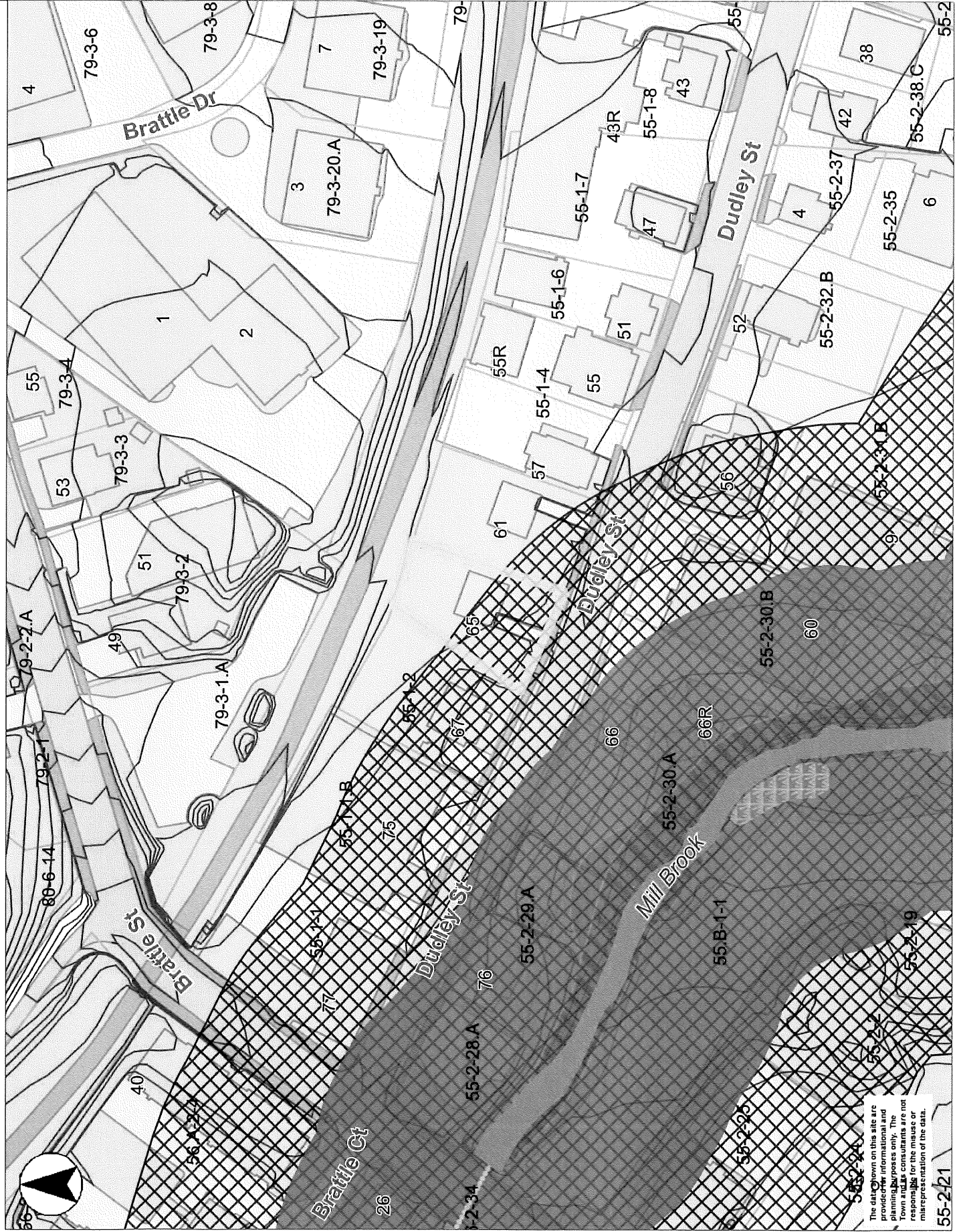
Signed under the pains and penalties of perjury, this 28th of *August*.

Iris Zheng

Name



- Abutting Towns
- Water Body
- Water Line
- Wetlands
- Wetland Regulated Buffer (100 ft)
- Wetland Regulated Riverfringe
- FEMA 1% - 100 Year Flood
- FEMA Floodway
- Elevation Contour (2ft)
- Buildings
- Master Plan - Town Bound
- Master Plan Base Map - S
- Parcels - For Gray Backgr
- Highways - White Interstate
- US Highway
- State Highway
- Pavement Markings
- Imperious Surface - For B
- Street
- Sidewalk
- Street Island
- Driveway
- Parking Lot
- Bike Path
- Roads - For Large Scale (ft)
- Roads - For Small Scale (ft)
- Major Road
- Local Road
- Master Plan Base Map - M
- Master Plan Base Map - W
- Master Plan Base Map - W
- Town Boundary - Gray Bac



Wetland and Flood GIS Viewer

The data shown on this site are for informational purposes only. The Town and its consultants are not responsible for the misuse or misrepresentation of the data.



Town of Arlington, Massachusetts

Notice of Intent: Thorndike Place.

Summary:

Notice of Intent: Thorndike Place.

The Conservation Commission will hold a public hearing under the Wetlands Protection Act to consider a Notice of Intent for the construction of Thorndike Place, a multifamily development on Dorothy Road in Arlington.

ATTACHMENTS:

	Type	File Name	Description
▢	Reference Material	2023-09-06_Notice_of_Intent.pdf	Thorndike Place Notice of Intent
▢	Reference Material	2023-09-05_Stormwater_Report.pdf	Thorndike Place Stormwater Report
▢	Reference Material	2023-09-06_Cover_Letter.pdf	Thorndike Place Cover Letter
▢	Reference Material	2023-09-05_Thorndike_Place_Plan_Set_-_STAMPED.pdf	Thorndike Place Plan Set

Arlington Land Realty LLC
Thorndike Place Residential Community

Notice of Intent

Arlington, MA

Town of Arlington Conservation Commission
September 2023

Prepared for:
Arlington Land Realty LLC
116 Huntington Avenue
Boston, MA 02116

BSC Project No. 23407.02

Prepared by:



803 Summer Street
Boston, MA 02127

Table of Contents

Thorndike Place Residential Community
Arlington, Massachusetts
Notice of Intent

	WPA FORM 3 COPY OF FILING FEE CHECKS
ATTACHMENT A	PROJECT NARRATIVE
ATTACHMENT B	SITE DESIGN PLANS-SEE SEPARATE VOLUME (INC. LOCUS MAP & ENVIRONMENTAL RESOURCES MAP) FEMA FIRMETTE SOILS MAP
ATTACHMENT C	SITE PHOTOGRAPHS
ATTACHMENT D	CERTIFIED LIST OF ABUTTERS NOTIFICATION TO ABUTTERS
ATTACHMENT E	STORMWATER REPORT-SEE SEPARATE VOLUME
ATTACHMENT F	COMPREHENSIVE PERMIT
ATTACHMENT G	WILDLIFE HABITAT EVALUATION



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Arlington

City/Town

Important:

When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note:
Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Dorothy Rd	Arlington	02474
a. Street Address	b. City/Town	c. Zip Code
Latitude and Longitude:	42.401476	-71.150199
	d. Latitude	e. Longitude
Various - see attached Narrative		
f. Assessors Map/Plat Number	g. Parcel /Lot Number	

2. Applicant:

Peter	Mugar	
a. First Name	b. Last Name	
Arlington Land Realty LLC		
c. Organization		
116 Huntington Avenue		
d. Street Address		
Boston	MA	02116
e. City/Town	f. State	g. Zip Code
617-459-9587	psmugar@gmail.com	
h. Phone Number	i. Fax Number	j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name	b. Last Name	
c. Organization		
d. Street Address		
e. City/Town	f. State	g. Zip Code
h. Phone Number	i. Fax Number	j. Email address

4. Representative (if any):

Dominic	Rinaldi	
a. First Name	b. Last Name	
BSC Group, Inc.		
c. Company		
803 Summer Street		
d. Street Address		
Boston	MA	02127
e. City/Town	f. State	g. Zip Code
(617) 896-4386	drinaldi@bscgroup.com	
h. Phone Number	i. Fax Number	j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

\$3,150.00	\$1,562.50	\$1,587.50
a. Total Fee Paid	b. State Fee Paid	c. City/Town Fee Paid



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Arlington

City/Town

A. General Information (continued)

6. General Project Description:

The proposed project is a multi-family housing development consisting of twelve (12) ownership units contained within six (6) duplex buildings, and 124-unit senior living residential apartment units located within a single residential building. Impacts are proposed within BLSF and 100-ft Buffer Zone to BVW.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

- | | |
|---|--|
| 1. <input type="checkbox"/> Single Family Home | 2. <input checked="" type="checkbox"/> Residential Subdivision |
| 3. <input type="checkbox"/> Commercial/Industrial | 4. <input type="checkbox"/> Dock/Pier |
| 5. <input type="checkbox"/> Utilities | 6. <input type="checkbox"/> Coastal engineering Structure |
| 7. <input type="checkbox"/> Agriculture (e.g., cranberries, forestry) | 8. <input type="checkbox"/> Transportation |
| 9. <input type="checkbox"/> Other | |

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☐ Yes ☒ No If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR 10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Middlesex South

a. County

1479

c. Book

b. Certificate # (if registered land)

27

d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

- ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
- ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.



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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. <input type="checkbox"/> Bank	1. linear feet	2. linear feet
b. <input type="checkbox"/> Bordering Vegetated Wetland	1. square feet	2. square feet
c. <input type="checkbox"/> Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. <input checked="" type="checkbox"/> Bordering Land Subject to Flooding	24,217 1. square feet 4,392.9 3. cubic feet of flood storage lost	2. square feet 9,160.8 4. cubic feet replaced
e. <input type="checkbox"/> Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced

f. ☐ Riverfront Area

1. Name of Waterway (if available) - **specify coastal or inland**

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: _____ square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet _____ b. square feet within 100 ft. _____ c. square feet between 100 ft. and 200 ft. _____

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f.** above.



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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users:
Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
a. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. <input type="checkbox"/> Land Under the Ocean	1. square feet _____ 2. cubic yards dredged _____	
c. <input type="checkbox"/> Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. <input type="checkbox"/> Coastal Beaches	1. square feet _____	2. cubic yards beach nourishment _____
e. <input type="checkbox"/> Coastal Dunes	1. square feet _____	2. cubic yards dune nourishment _____
	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
f. <input type="checkbox"/> Coastal Banks	1. linear feet _____	
g. <input type="checkbox"/> Rocky Intertidal Shores	1. square feet _____	
h. <input type="checkbox"/> Salt Marshes	1. square feet _____	2. sq ft restoration, rehab., creation _____
i. <input type="checkbox"/> Land Under Salt Ponds	1. square feet _____	
	2. cubic yards dredged _____	
j. <input type="checkbox"/> Land Containing Shellfish	1. square feet _____	
k. <input type="checkbox"/> Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above	
	1. cubic yards dredged _____	
l. <input type="checkbox"/> Land Subject to Coastal Storm Flowage	1. square feet _____	

4. ☐ Restoration/Enhancement

If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW _____

b. square feet of Salt Marsh _____

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings _____

b. number of replacement stream crossings _____



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C. Other Applicable Standards and Requirements

- ☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

a. ☐ Yes ☒ No

If yes, include proof of mailing or hand delivery of NOI to:

**Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581**

August 1, 2021

b. Date of map

If yes, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

- c. Submit Supplemental Information for Endangered Species Review*

1. ☐ Percentage/acreage of property to be altered:

(a) within wetland Resource Area

percentage/acreage

(b) outside Resource Area

percentage/acreage

2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

(a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

(b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see <https://www.mass.gov/endangered-species-act-mesa-regulatory-review>).

Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.



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C. Other Applicable Standards and Requirements (cont'd)

- (c) ☐ MESA filing fee (fee information available at <https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review>).

Make check payable to "Commonwealth of Massachusetts - NHESP" and **mail to NHESP** at above address

Projects altering 10 or more acres of land, also submit:

- (d) ☐ Vegetation cover type map of site
- (e) ☐ Project plans showing Priority & Estimated Habitat boundaries
- (f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, <https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat>; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. a. NHESP Tracking # _____ b. Date submitted to NHESP _____

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

- a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

- c. ☐ Is this an aquaculture project? d. ☐ Yes ☐ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).



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C. Other Applicable Standards and Requirements (cont'd)

Online Users:

Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?
a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.
- b. ACEC
5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?
a. ☐ Yes ☒ No
6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?
a. ☐ Yes ☒ No
7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?
a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:
1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)
2. ☐ A portion of the site constitutes redevelopment
3. ☒ Proprietary BMPs are included in the Stormwater Management System.
- b. ☐ No. Check why the project is exempt:
1. ☐ Single-family house
2. ☐ Emergency road repair
3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

- ☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)
2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.



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Arlington

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D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Full Plan Set - Thorndike Place

a. Plan Title

Dominic Rinaldi - BSC Group, Inc.

Dominic Rinaldi

b. Prepared By

c. Signed and Stamped by

08/18/2021

1"=50'

d. Final Revision Date

e. Scale

f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.
6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.
7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.
8. ☒ Attach NOI Wetland Fee Transmittal Form
9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

#35736

8/21/2023

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

BSC Companies

6. Payor name on check: First Name

7. Payor name on check: Last Name



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

Provided by MassDEP:

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

MassDEP File Number _____

Document Transaction Number _____

City/Town _____

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant

3. Signature of Property Owner (if different)

5. Signature of Representative (if any)

2. Date

4. Date

6. Date

For Conservation Commission:

Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:

One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:

If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
NOI Wetland Fee Transmittal Form
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Applicant Information

1. Location of Project:

Dorothy Road

a. Street Address

Arlington

b. City/Town

\$1,562.50

d. Fee amount

c. Check number

2. Applicant Mailing Address:

Peter

a. First Name

Mugar

b. Last Name

Arlington Land Realty LLC

c. Organization

116 Huntington Ave

d. Mailing Address

Boston

e. City/Town

MA

f. State

02116

g. Zip Code

617-459-9587

h. Phone Number

i. Fax Number

psmugar@gmail.com

j. Email Address

3. Property Owner (if different):

a. First Name

b. Last Name

c. Organization

d. Mailing Address

e. City/Town

f. State

g. Zip Code

h. Phone Number

i. Fax Number

j. Email Address

B. Fees

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract \$12.50. To calculate the city/town share of the fee, divide the total fee in half and add \$12.50.

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).



Massachusetts Department of Environmental Protection
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 3b	3	\$1,050	\$3,150

Step 5/Total Project Fee: _____

Step 6/Fee Payments:

Total Project Fee:	\$3,150
	a. Total Fee from Step 5
State share of filing Fee:	\$1,562.50
	b. 1/2 Total Fee less \$12.50
City/Town share of filing Fee:	\$1,587.50
	c. 1/2 Total Fee plus \$12.50

C. Submittal Requirements

- a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

- b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

BSC COMPANIES, INC.

35736

Re.

Check Total: \$1,587.50

08/21/2023

Pay To Town of Arlington

Invoice No.	Invoice Date	Invoice Amount	Amount Due	Discount	Apply	Balance
08172023	08/17/2023	1,587.50	1,587.50	0.00	1,587.50	0.00

BSC COMPANIES, INC.
803 SUMMER STREET
BOSTON, MA 02127

 **Eastern Bank**

Boston, MA 02110
easternbank.com
1-800-EASTERN



53-179/113

35736

One Thousand Five Hundred Eighty Seven and 50/100 Dollars

DATE

AMOUNT

8/21/2023

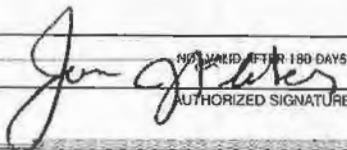
\$1,587.50

PAY
TO THE
ORDER
OF

Town of Arlington
Attn: Arlington Conservation Commission
730 Massachusetts Avenue
Arlington, MA 02476

TWO SIGNATURES REQUIRED OVER \$2,500




NOT VALID AFTER 180 DAYS
AUTHORIZED SIGNATURE

Security features. Details on back.

⑈035736⑈ ⑆011301798⑆ 0600659304⑈

Attachment A

Thorndike Place Residential Community
Arlington, Massachusetts
Notice of Intent

PROJECT NARRATIVE

1 INTRODUCTION

BSC Group, Inc. (BSC) is filing this Notice of Intent (NOI) on behalf of Arlington Land Realty LLC (the Applicant) for development of Thorndike Place, a multi-family housing development consisting of twelve (12) ownership units contained within six (6) duplex buildings, together with 124-unit senior living residential apartment units located within a single residential building off Dorothy Road, Arlington, MA (the Project). This NOI is being submitted in accordance with the Massachusetts Wetlands Protection Act (M.G.L. Ch.131, S.40) (WPA) and its implementing regulations (310 CMR 10.00). The November 21, 2021, Comprehensive Permit issued by the Arlington Board of Appeals is the master permit for local bylaw and regulations, inclusive of the Arlington Wetlands Bylaw and Regulations. For reference, a copy of the November 21, 2021, Comprehensive Permit is included in **Attachment F**.

As the Conservation Commission likely recalls from its involvement within the Comprehensive Permit public hearing process, Thorndike Place is a proposed rental and ownership residential community on a 17.7-acre parcel of land, located between Route 2/Concord Turnpike to the south, residential neighborhoods to the north and west, and Thorndike Park to the east. The project includes twelve (12) for sale family homes contained within six (6) duplex buildings, together with 124-unit residential apartment units for adults over 62 years of age located within a single residential building on an approximate 5.7-acre area of the site. During the Comprehensive Permit process, the Applicant agreed to retain approximately 12-acres of the site as protected open space, which will be subject to a conservation restriction. The Project site is shown on the Town of Arlington Assessors' records as Assessors Parcel ID Nos. 13-12-5A, 14-2-5, 14-2-8, 16-8-2, 16-8-3, 16-8-4, 16-8-5, 16-8-6, 16-8-7A, 16-8-8, and 17-5-6A.

The proposed work jurisdictional under the WPA associated with the Project is limited to work within the FEMA 100-Year Floodplain / Bordering Land Subject to Flooding (BLSF) and Buffer Zone to Bordering Vegetated Wetlands (BVW). Specifically, impacts to BLSF include 32,616-sf / 4,392.9-cu ft of fill, for which the Project work has been designed to provide compensatory storage of approximately 9,160.8 cu ft, which is greater than two times the amount of flood storage lost and beyond what is required under the WPA, and is consistent with the compensatory storage that would be required under the local bylaw. The project includes no direct alteration of BVW, but does impact 34,084-sf of Buffer Zone, of which the majority is in the outer portion of the buffer. For additional information, please refer to the Stormwater Report included in **Attachment E**. This Stormwater Report was extensively peer reviewed by BETA Group during the Comprehensive Permit process. In accordance with the Comprehensive Permit, additional soil testing was conducted in May 2023, and minor revisions to the stormwater design have been performed based on this soil testing.

The proposed Project will result in impacts to FEMA 100-Year Floodplain / Bordering Land Subject to Flooding (BLSF), and the 100-ft Buffer Zone to Bordering Vegetated Wetlands (BVW). Impacts include 32,616-sf / 4,392.9-cu ft of fill within BLSF (for which 9,160.8-cu ft of compensatory flood storage will be provided), and 34,084-sf of impacts to the 100-ft Buffer Zone to BVW (associated with built area and areas of porous pavement). Compensatory flood storage is being provided at a 2:1 ratio (volume provided to volume lost). For additional information, please refer to the Stormwater Report included in **Attachment E**.

The Applicant has performed an analysis of alternatives through the Comprehensive Permit process, focused on the layout of project elements, and the Project has been designed to avoid and minimize the potential for adverse impacts to wetland resource areas to the greatest extent

practicable, while still meeting the project purpose and objectives. Where impacts could not be completely avoided (within BLSF), compensatory flood storage will be provided. Furthermore, the Project proposes to protect 12 acres of open space under a Conservation Restriction.

2 EXISTING CONDITIONS

The Site is approximately 17.7+/- acres in size and is largely forested, with extensive areas overrun with invasive species including Bitterroot (*Lewisia rediviva*), Japanese Knotweed (*Reynoutria japonica*), and Multiflora rose (*Rosa multiflora*). The soils onsite are generally decomposed organic material over loose sandy and gravelly glaciofluvial deposit. Approximately 11.5 acres of the total site consist of floodplain, together with a contiguous upland buildable area of roughly 5.6 acres. There are four (4) depressional wetlands located on the site.

The topography of the site is undulating with small to medium sized depressions in the northerly portion of the property. To the north, site elevations range from elevation 9 to 11 feet; frontage along Route 2/Concord Turnpike is generally between elevations 6 to 10 feet. The westerly portion of the site is the highest elevation, at 12+ feet.

According to the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey, the site soil type is predominantly udorthents with a wet substratum (see **Attachment B** for soils map).

Hydrologically, the site is located within the Mystic Watershed, which drains an area of approximately 76 square miles. The Alewife River is located approximately 1,000-ft to the south of the site, with Little Pond and Spy Pond to the west.

2.1 Resource Area Summary

BSC conducted both a desktop analysis (using MassGIS datalayers and publicly available data), and field investigations of the proposed Project area, to assess permitting requirements pursuant to the WPA. Wetland delineations were conducted in October 2020 and January 2021, in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, ed. J.S. Wakely, R.W. Lichvar, and C. C. Noble. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center (Version 2.0) and methodology described in the Massachusetts Department of Environmental Protection's (MassDEP) *Handbook on Delineating Bordering Vegetated Wetlands* (Published in March 1995).

Based on the desktop review and field investigations, portions of the Project are located within FEMA 100-Year Floodplain / Bordering Land Subject to Flooding (BLSF), and the 100-ft Buffer Zone to Bordering Vegetated Wetland (BVW).

According to FEMA Flood Insurance Rate Maps (FIRM No. 25017C0419E, dated June 4, 2010), portions of the Project area are located within Flood Zone AE, with an approximate elevation of 6.8 feet. This zone corresponds to the 100-year flood elevation which defines the boundary of Bordering Land Subject to Flooding. BSC Group performed on-the-ground field survey between December 2019 and February 2020. Using this field surveyed topography, BLSF with an elevation of 6.8 is shown on the project Site Plans in **Attachment B**.

Four (4) Bordering Vegetated Wetlands (BVW) were delineated within the site parcel and there are two (2) Isolated Vegetated Wetlands (IVW) that are non-jurisdictional under the Massachusetts WPA. BVW on the site is predominantly forested, with pockets of emergent marsh. Common tree species include red maple (*Acer rubrum*), box elder (*Acer negundo*),

American elm (*Ulmus Americana*), white pine (*Pinus strobus*), ash (*Fraxinus sp.*), American Sycamore (*Plantanus occidentalis*), and black willow (*Salix nigra*). Shrub and sapling species include silky dogwood (*Swida amomum*), and box elder saplings. Herbaceous species include common reed, cinnamon fern (*Osmundastrum cinnamomeum*), sensitive fern (*Onoclea sensibilis*), and goldenrod (*Solidago sp.*), and vines include poison ivy (*Toxicodendron radicans*), bittersweet (*Celastrus sp.*), greenbriar (*Smilax sp.*) and wild grape (*Vitis sp.*).

The Project area does not include Outstanding Resource Waters (ORW), Areas of Critical Environmental Concern (ACEC), Natural Heritage Endangered Species (NHESP) Priority or Estimated Habitat, Vernal Pools, or Wellhead Protection Areas. Wetlands were evaluated for potential vernal pool habitat function during a wildlife habitat evaluation conducted by BSC in 2020 (**Attachment G**).

Existing conditions, wetland resource areas, and buffer zones are shown on the Environmental Resources Map and the Site Plans in **Attachment B**. Representative photographs and Wetland Delineation Memo with data sheets are provided in **Attachment C**. The wetland delineations for the Project were peer reviewed by BETA Group during the Comprehensive Permit process.

3 PROJECT ACTIVITIES & ASSOCIATED IMPACTS

The proposed project includes twelve (12) for sale family homes contained within six (6) duplex buildings, together with 124-unit residential apartment units for adults over 62 years of age located within a single residential building. The duplexes will border Dorothy Road, and be consistent with the height, scale and spacing of the existing homes along the road. Each duplex includes a driveway and garage/carport, except the eastern-most unit, which includes space for parking in the rear.

The 124 residential apartments for adults over 62 years of age will be set further back from the road and will include a mix of studios and one- and two-bedroom units. This building includes both structured, below-grade parking and surface parking as well as a cul-de-sac style drop off area with adjacent loading/delivery space. Vehicular access to this building will be from a single driveway near the intersection of Dorothy Road and Littlejohn Street, but emergency access is provided around the entire building via a shared use path consisting of a 6-foot porous asphalt walk with 7-feet of reinforced grass to each side.

Outdoor amenity space is provided along the western side of the property and both interior and exterior bicycle storage will be provided. The project includes utility connections for each building and stormwater management systems designed in compliance with the Massachusetts DEP's Stormwater Standards. For more detail of the proposed activities, please refer to the Site Plans in **Attachment B** and the Stormwater Report in **Attachment E**.

3.1 Proposed Project Activities

Project activities are expected to commence in spring or summer of 2024, pending the receipt of all necessary permits and approvals. The anticipated construction sequence will occur in Phases, described briefly as follows, and in more detail in **Attachment E**, the Stormwater Management Report:

- Phase 1:
 - Field staking of wetlands by a qualified wetland scientist within work areas.

- Flagging of all trees, shrubs, invasives, and other materials to be removed as part of the invasive species and woodland restoration plan.
- Installation of soil erosion and sediment controls.
- Phase 2: Earthwork, site utilities, retaining walls, and stormwater management facilities and compensatory storage areas.
- Phase 3: Building construction; final site paving, striping, site stabilization and plantings.
- Upon completion, construction materials and erosion/sediment controls will be removed, and the planted areas will be monitored in accordance with the Comprehensive Permit.

The locations of temporary and permanent activities within wetland resource areas are shown on the Environmental Resources Map and Site Plans provided in **Attachment B**. Permanent Project Impacts are summarized in Table 3-1, below.

Table 3-1: Project Impacts within Wetland Resource Areas and Buffer Zones

Resource Area	Permanent Impacts	
BLSF	Impervious surface (buildings)	8,357 sft
	Semi-pervious surface (porous pavement)	4,511 sft
	Pervious surface (vegetated/landscaped areas)	6,895 sft
	Grading	12,853 sft
100-ft Buffer Zone	Impervious surface (buildings)	630 sft
	Semi-pervious surface (porous pavement)	3,998 sft
	Pervious surface (vegetated/landscaped areas)	1,052 sft
	Grading	28,404 sft
	Woodland Restoration Area (temp. impacts)	23,985 sft

In addition to direct impacts within BLSF (for which compensatory flood storage will be provided), Project activities will alter the site hydrology. To address this, and document pre- and post-construction stormwater conditions, a Stormwater Management Report has been prepared (**Attachment E**).

A summary of the Project's conformance with the performance standards established by the WPA and the Massachusetts Stormwater Regulations is provided in Section 6. A full analysis of the Project's design and conformance with these standards is provided in **Attachment E** (Stormwater Report), and the Site Plans (**Attachment B**).

A description of those work activities proposed within BLSF and the 100-ft Buffer Zone is provided below.

3.1.1 Vegetation Management & Tree Removal

During site preparation, vegetation management and tree removal activities will be required within BLSF and the 100-ft Buffer Zone to BVW. Tree removal in most locations is associated with earthwork, either to create the areas for construction of project facilities, or grading/filling to create appropriate contours to support the project facilities, be it roadways, building, parking lots, or stormwater management systems. The majority of this work will result in the need to grub and complete stump removal, with removal of larger woody material or grinding and chipping of

smaller woody material that may be re-used on site or exported off-site. All areas of disturbed soils that are not developed as project facilities will be re-vegetated. Re-vegetation will contribute to erosion and sediment control measures, create beneficial habitat, provide stormwater management, and improve project site aesthetics. Approximately 12 acres of the 17.7-acre site is proposed to be protected and preserved in perpetuity under a Conservation Restriction. This area will remain forested with no project activities occurring within its limits.

As part of the Comprehensive Permit process, the Applicant has agreed to submit an invasive species management plan to the Director of Planning and Community Development and a Landscape Plan to the Zoning Board of Appeals for areas under the jurisdiction of Section 24 of the Arlington Wetlands Bylaw. This area is shown on the Site Plans in **Attachment B** and will include cutting and stumping of dead trees that do not provide wildlife habitat; invasive species removal; and restoration with native tree, shrub, and grass plantings. This work will be directed by a Professional Landscape Architect and Wetland Ecologist to ensure that only appropriate plantings will be removed and replaced, and all work will be performed in coordination with Town of Arlington staff (or their designees), in accordance with the Comprehensive Permit and any Orders of Conditions issued by the Arlington Conservation Commission.

The project planting plan has been developed to include replacement of trees removed at a ratio determined by size. Table 3-2 (below) details the species, number, and size of each tree within jurisdictional areas to be removed as part of the project, as well as the corresponding number of “in-kind” replacement trees required. The number of “in-kind” trees was determined from Table F.1 Tree Replacement Requirements in the Arlington Regulations.

Table 3-2: Tree removal and replacement details

Species	1.5"-6" Decid dbh 4'-6' Evergreen	6"-10" Decid dbh 6'-10' Evergreen	>10" Decid dbh >10' Evergreen	Replacement Quantity Required
American Elm	2	1	3	19
Black Cherry	21	16	13	142
Yellow Birch	1	0	3	14
Box Elder	12	10	2	62
Chinese Crabtree	4	0	0	8
White Ash	2	3	0	13
Common Buckthorn	2	1	0	7
Chinese Sumac	2	0	3	16
Staghorn Sumac	1	0	0	2
Amur Honeysuckle	1	0	0	2
Black Locust	0	2	0	6
Paradise Apple	1	2	0	8
Honey Locust	0	1	0	3
Silver Maple	0	0	5	20
Red Elm	0	0	1	4
Red Maple	0	0	1	4
Norway Maple	12	3	5	53
Black Alder	1	0	0	2
Butternut Hickory	1	0	1	6
Common Hackberry	0	1	0	3
Field Elm	0	1	1	7
Green Ash	0	1	1	7
Sweet Cherry	1	0	0	2
Carolina Buckthorn	1	0	0	2
American Hornbeam	1	0	0	2
Black Ash	1	0	0	2
Mexican Plum	0	1	0	3
Sweet Birch	0	0	2	8
TOTAL	67	43	41	427

Due to the extensive local requirements for revegetation, the Project has made every effort to replant the required “in-kind” replacement per Section 25 of the Arlington bylaw. However, as the impacted jurisdictional resource areas are already heavily vegetated, planting almost 300 more trees in the same area will result in crowded conditions that will reduce the success of plantings. As such, the project is maximizing the replacement tree plantings (see Planting Plan included in **Attachment B**) and is willing to seek alternate methods to full compliance with Section 25 in coordination with the Conservation Commission.

All “in-kind” replacement plantings will be in accordance with the requirements of Section 25 and will be monitored on an annual basis for three years by a Professional Landscape Architect and Wetland Ecologist (as appropriate). This three-year period shall begin in the first planting year, if plantings occur in the Spring, or the year after planting, if the plantings occur in the Fall. A report on the status of all plantings will be prepared and submitted annually in June to the Conservation Commission and ZBA (or their designees) in accordance with Condition C.1.e. of the Comprehensive Permit. The report will include photo documentation, the health of new

plantings, and any mitigation required. New plantings that do not survive during this monitoring period will be replaced in-kind and will be noted in the annual reports.

3.1.2 Site Preparation and Grading

In order to create a level site for the residential community, site grading will be required. This will include 18,900-sf of grading within Buffer Zones, and 4,412-sf within BLSF. Existing site elevations vary from approximately 6 – 12 feet, and as such grading requirements are minimal.

3.1.3 Buildings and Paved Areas

Portions of the proposed residential development are located within BLSF (19,817-sf). This includes buildings, driveways, paved and vegetated areas, and utilities. A Stormwater Report is provided in **Attachment E** and includes details for Low Impact Design measures to be incorporated into the site, including planted areas, porous paving, and rain gardens, and infiltration systems. Compensatory flood storage mitigation will be provided at a 2:1 ratio of replacement-to-loss with the locations of compensatory flood storage areas shown on the Site Plans in **Attachment B**.

A small portion of the proposed multi-unit building and associated emergency access is also located within the 100-ft Buffer Zone to BVW. Porous asphalt and reinforced grass surface will be used for the emergency access, minimizing stormwater impacts within the Buffer Zone.

3.1.4 Stormwater Management Construction

A complete Stormwater Management Report is provided in **Attachment E**. All stormwater management policies and standards for the proposed project are consistent with the Massachusetts Stormwater Standards. Stormwater will be managed via underground infiltration systems and a small bio-retention area/rain garden. Likewise, the site grading, drainage improvements and stormwater management will incorporate Low Impact Design techniques such as: green landscaping, permeable pavement, rain gardens, and use of building rooftops as blue roofs. The system is designed to capture and infiltrate the required water quality volume and recharge volumes, so that post development peak discharge does not exceed pre-development rates. The stormwater system will be in full compliance with MassDEP stormwater management standards and

Stormwater runoff from a portion of the 4-story building will be temporarily detained on the roof of the building. This collected runoff will be released at controlled rates through roof drains to an underground infiltration system in the adjacent driveway and drop-off area. The majority of the 4-story building roof will discharge at grade directly to the surface and flow overland towards the wetlands to the south.

Stormwater runoff from the site driveway and small parking/drop-off area at the main entrance to the building will be collected via a deep sump catch basin, conveyed through a water quality unit before being directed to the underground infiltration system. Stormwater runoff from the driveway into the garage below the building will be collected via a trench drain and conveyed through a water quality unit before being directed to the underground system. Due to its elevation difference, this leg of the system has been provided with a backflow preventer device. In addition, runoff from the townhouse and carport roofs, as well as the landscaped areas between the townhouses and 4-story building will be collected and routed to the underground infiltration area. This underground infiltration system provides for recharge to groundwater and provides peak flow rate attenuation. In larger storm events, this system will overflow through an outlet control structure to a flared end section with a rip-rap apron to the south.

Stormwater runoff from the townhouse driveways along Dorothy Rd will be collected via individual trench drains and routed to small underground infiltration chamber systems beneath each driveway. Each system is designed to completely hold and infiltrate the 100-year, 24-hour storm event.

To provide emergency access to the sides and rear of the building, a reinforced grass access lane will be installed. A portion of this access lane will include a 6-ft wide, porous asphalt walkway, providing ADA/AAB accessible access for residents to the rear of the site. Both the reinforced grass and porous asphalt will allow stormwater runoff to freely infiltrate into the ground and will result in negligible runoff.

3.1.5 Spill Prevention and Response

Potential sources of pollution during construction are:

- Sediment from exposed soils and dewatering.
- Construction material debris.
- Human waste.
- Concrete washout.
- Diesel, gasoline, and hydraulic and engine oil.

As described in more detail in *Section 6.4 - Pollution Prevention Standards* of the Stormwater Management Report (**Attachment E**), the project will be constructed with the necessary procedures, equipment, and materials in place, to minimize the potential for pollution during construction within wetland resource areas and buffer zones.

4 ALTERNATIVES ANALYSIS

During the Comprehensive Permit approval process, several alternatives were evaluated in determining the final Project layout and design. Alternatives were evaluated for their potential to reduce impacts to wetland resource areas and buffer zones, as well as for their overall impact on the surrounding community and abutters. While multiple iterations of a particular alternative were prepared, for the purposes of this NOI, two alternatives (in addition to the version of the Project approved under the 2021 Comprehensive Permit), were submitted to ZBA and evaluated. These alternatives are detailed below.

4.1 Alternative 1

The initial site design alternative (*Alternative 1*), was the original project submitted for a Comprehensive Permit. This alternative included multiple duplex buildings adjacent to Dorothy Road, as well as two large multi-unit residential buildings further back into the site. This alternative included driveways from Dorothy Road, Parker Street, and Burch Street at Edith Street and included extensive surface parking and driveways. This alternative would result in direct impacts to BVW, BLSF, and 100-ft Buffer Zone, and would result in far greater site disturbance than either of the other alternatives evaluated. Based upon feedback from the Town and surrounding community, this alternative was replaced in September 2020.

4.2 Alternative 2

This alternative was submitted to replace *Alternate 1* in the Comprehensive Permit process in September 2020. It included a single, multi-unit residential building, set closer to Dorothy Road

to limit impacts to protected resource areas and associated buffers. The alternative included a single driveway off Dorothy Road, a resident pick up/drop-off circular driveway further east on Dorothy Road, no direct impacts to BVW, and significantly reduced impacts to BLSF and 100-ft BVW Buffer. While the overall resource area and buffer zone impacts of this alternative are approximately equivalent to the plans approved by the Comprehensive Permit, this alternative was replaced by the approved version in response to Town and community input regarding visual, traffic, and other impacts on the surrounding neighborhood.

5 CONFORMANCE WITH PERFORMANCE STANDARDS OF THE WPA

5.1 Bordering Land Subject to Flooding

[310 CMR 10.57(4) (a)]: 1. Compensatory storage shall be provided for all flood storage volume that will be lost as the result of a proposed project within Bordering Land Subject to Flooding, when in the judgment of the issuing authority said loss will cause an increase or will contribute incrementally to an increase in the horizontal extent and level of flood waters during peak flows.

In total, approximately 4,392.9-cft of BLSF will be impacted by the Project. Compensatory flood storage shall be provided at a 2:1 ratio of replacement-to-loss (9,160.8-cft of compensatory flood storage to be provided), exceeding the requirements of the WPA regulations and resulting in a net increase in the flood storage capacity of the site. No loss in flood storage volume will occur as a result of the proposed Project, and no increase in the horizontal extent of flood waters during peak flows will occur.

2. Compensatory storage shall mean a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which would be displaced by the proposed project. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or water body. Further, with respect to waterways, such compensatory volume shall be provided within the same reach of the river, stream or creek.

Work within Bordering Land Subject to Flooding, including that work required to provide the above-specified compensatory storage, shall not restrict flows so as to cause an increase in flood stage or velocity.

As described above, the Project proposes a loss of 4,392.9-cft flood storage, which will be mitigated through the provision of 9,160.8-cft of compensatory storage. No loss in flood storage volume will occur as a result of the proposed Project, and activities within BLSF shall not restrict flows or result in an increase in flood stage or velocity and will maintain an unrestricted hydraulic connection to the existing flood plain.

3. Work in those portions of bordering land subject to flooding found to be significant to the protection of wildlife habitat shall not impair its capacity to provide important wildlife habitat functions. Except for work which would adversely affect vernal pool habitat, a project or projects on a single lot, for which Notice(s) of Intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold, or altering vernal pool habitat, may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60.

No rare species are recorded from this area and there are no vernal pools located within the Project area. While the Project will result in the loss of wildlife habitat features including mature trees, woody debris, and other forest features, the area has been impacted by illegal dumping, and use as a homeless encampment (see site photos in **Attachment C**). In general, wildlife species will not cohabitate with humans, and the presence of the large encampment and extensive areas of trash and waste spread throughout site depress any wildlife habitat values that may exist in this fragmented and isolated forest patch.

Following construction, woodland restoration and invasive species management are proposed within the parcel, and a considerable portion of the site (12 out of 17.7 acres), is proposed to be preserved as open space under a Conservation Restriction.

5.2 100-Foot Buffer Zone to Bordering Vegetated Wetland

The Project proposes a small amount of work within Buffer Zone to Bordering Vegetated Wetland. The Site Plans in **Attachment B** comply with the Approved Plans referenced in the Comprehensive Permit.

6 PROPOSED MITIGATION TECHNIQUES

6.1 Avoidance, Minimization and Mitigation

The Project has undertaken extensive measures to avoid and minimize impacts to wetland resource areas. Where impacts are unavoidable, mitigation is proposed.

An alternatives analysis was conducted for the Project, and where feasible, impacts to wetland resource areas and buffer zones have been minimized through:

- Location and configuration of buildings, paved areas, and stormwater facilities outside of the 100-ft Buffer Zone wherever possible.
- Proposed preservation of a large portion (12 acres) of the forested site under a Conservation Restriction.
- Plans for replanting and restoration of existing degraded areas and removal of invasive species.

6.2 Stormwater Management

A complete Stormwater Management Report is provided in **Attachment E**. Design features which have been incorporated into the Project to reduce and manage site stormwater include:

- Use of porous paving for pathways around the site, which are located partially within BLSF and 100-ft Buffer Zones to BVW.
- Multiple underground infiltration areas to collect, treat, and recharge to groundwater across the developed portion of the site.
- Construction of an infiltrating bio-retention area/rain garden to provide stormwater treatment and additional recharge to groundwater.
- Compliance with the DEP Stormwater Management Standards.

6.3 Compensatory Flood Storage

As previously detailed, compensatory flood storage will be provided at a 2:1 ratio of replacement-to-loss exceeding the requirements of the Wetlands Protection Act. These compensatory storage

areas, which are located southeast of the proposed buildings, will be revegetated with a combination of wetland seed mix and native wetland tree saplings to ensure that the vegetation in this area thrives through both flood and non-flood events.

6.4 Best Management Practices (BMPs)

Throughout the Project construction phase, all construction crews and personnel will implement Project specific BMPs to ensure that activities are completed in accordance with all applicable environmental laws and regulations. The following sections provide a summary of BMPs that will be implemented for this Project. BMP details are also provided on the Site Plans in **Attachment B**.

6.4.1 Sediment and Erosion Controls

Prior to site preparation and construction, sediment and erosion controls will be installed around the site perimeter, as well as around sensitive resource areas (wetlands and streams), and staging areas and stockpiles. Proposed sediment and erosion controls include:

- Designated staging areas and stockpiles surrounded by silt fence.
- Filter tube berm around lower perimeter of Project site.
- Inlet protection for existing catch basins.
- Filter fabric silt fence installed along toe of all critical cut and fill slopes.
- All sediment and erosion controls to be maintained and/or replaced periodically, as required.
- 6' chain-link construction fence to be installed selectively as shown on plans, to protect resource areas and buffer zones.
- Temporary disturbed areas to be mulched and seeded with rye grass.
- Permanent stabilization and seed mixes - all areas to be seeded or sodded within 7 days.

6.4.2 Construction Access

Prior to site preparation and construction, stabilized construction entrances will be installed. Construction entrances will be located within the perimeter silt fence and will be stabilized with rip rap (where necessary). Site entrances will be swept regularly to avoid tracking of dust and debris onto public roads.

6.4.3 Vehicle and Equipment Refueling and Maintenance

To prevent impacts from hazardous materials, if refueling and vehicle/equipment maintenance in the field are necessary, vehicles and equipment will be brought to an area greater than 100-ft away from sensitive environmental features and all reasonable environmental precautions will be taken. A paved area, such as a parking lot or roadway, is preferred to minimize the possibility of spill or release to the environment. Refueling precautions will include frequent checks for fuel spills, drips, or seeps during the refueling operation. Spill control and containment equipment will be kept in the work area. Materials and equipment necessary for spill cleanup will be kept either in the work area or in an otherwise accessible on-site location.

The Contractor will be responsible for preventing spills in accordance with the project specifications and applicable federal, state, and local regulations. The Contractor will identify a

properly trained site employee, involved with the day-to-day site operations to be the spill prevention and cleanup coordinator. The name(s) of the responsible spill personnel will be posted on-site.

Each employee will be instructed that all spills are to be reported to the spill prevention and cleanup coordinator. The supervisor will assess the incident and initiate proper containment and response procedures immediately upon notification. Workers should avoid direct contact with spilled materials during the containment procedures. Primary notification of a spill should be made to the local Fire Department and Police Departments. Secondary notification will be to the certified cleanup contractor if deemed necessary by fire and police personnel. The third level of notification (within 1 hour) is to the DEP or municipality's Licensed Site Professional (LSP). The specific cleanup contractor to be used will be identified by the Contractor prior to commencement of construction activities.

6.4.4 Materials Stockpiling

As part of the Phase I sediment controls, soils will be loaded directly into dump trucks and removed from the site, or soil stockpile areas will be established on-site. The stockpile areas will be surrounded by poly wrapped haybale berms and compost filter tube and silt fencing, as identified on the referenced drawings and stabilized if unused for more than 14-days (e.g., hydroseed with an appropriate annual or winter rye seed mix and tackifier). The initial stockpile area will be established at the outset of the construction activities on site. As construction progresses, stockpile areas may be relocated as needed but must maintain the erosion and sediment control protection described above.

6.4.5 Dewatering

Based on the proposed construction activities, the depths of proposed excavations, and the known ground water table elevation, dewatering practices are anticipated to be required for deeper excavations, foundations, and site features. Water infiltration to the foundation excavation can likely be controlled using gravity-fed sump pumps via gravel trenches or sumps assisted with collector trenches. The dewatering measures implemented should adequately dewater all foundation-related excavations such that compaction of footing subgrades is feasible. All dewatering activities shall be supervised and witnessed by the designated erosion control monitor. Dewatering activities shall be monitored daily by the erosion control monitor to ensure that sediment laden water is appropriately settled prior to discharge toward the wetland resource area. No discharge of water is allowed directly into an area subject to jurisdiction of the Wetlands Protection Act.

6.4.6 Concrete Washout

Concrete waste will be placed in a designated dumpster (or comparable structure) and concrete washout will occur in designated containment areas outside of wetland resource areas and buffer zones.

6.4.7 Restoration of Disturbed Areas

During construction, any area of exposed soils that will be left idle for more than 30 days shall be stabilized with a layer of mulch hay or other means approved by the Conservation Commission. For areas that are not meant to remain actively utilized, stabilization procedures will occur on the following schedule in compliance with Section 2.2.14 of the CGP:

- Initiate the installation of stabilization measures immediately in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days.
- Complete the installation of stabilization measures as soon as practicable, but no later than 14 calendar days after stabilization has been initiated.

All exposed soil finish grade surfaces shall be immediately landscaped and stabilized, loamed, seeded, and mulched with a layer of mulch hay. All disturbed areas must be graded, loamed, and seeded prior to November 1st of each year. Outside of the growing season, beyond November 15th of any construction year, exposed soil finish grade surfaces shall be stabilized with a layer of mulch hay, straw, tackifier or biodegradable erosion control blanket until climate conditions allow for seeding.

All temporary erosion and sedimentation controls will be removed after final site stabilization.

7 CONCLUSION

Although portions of the Project will occur within BLSF and the 100-ft Buffer Zone to BVW, the proposed Project will:

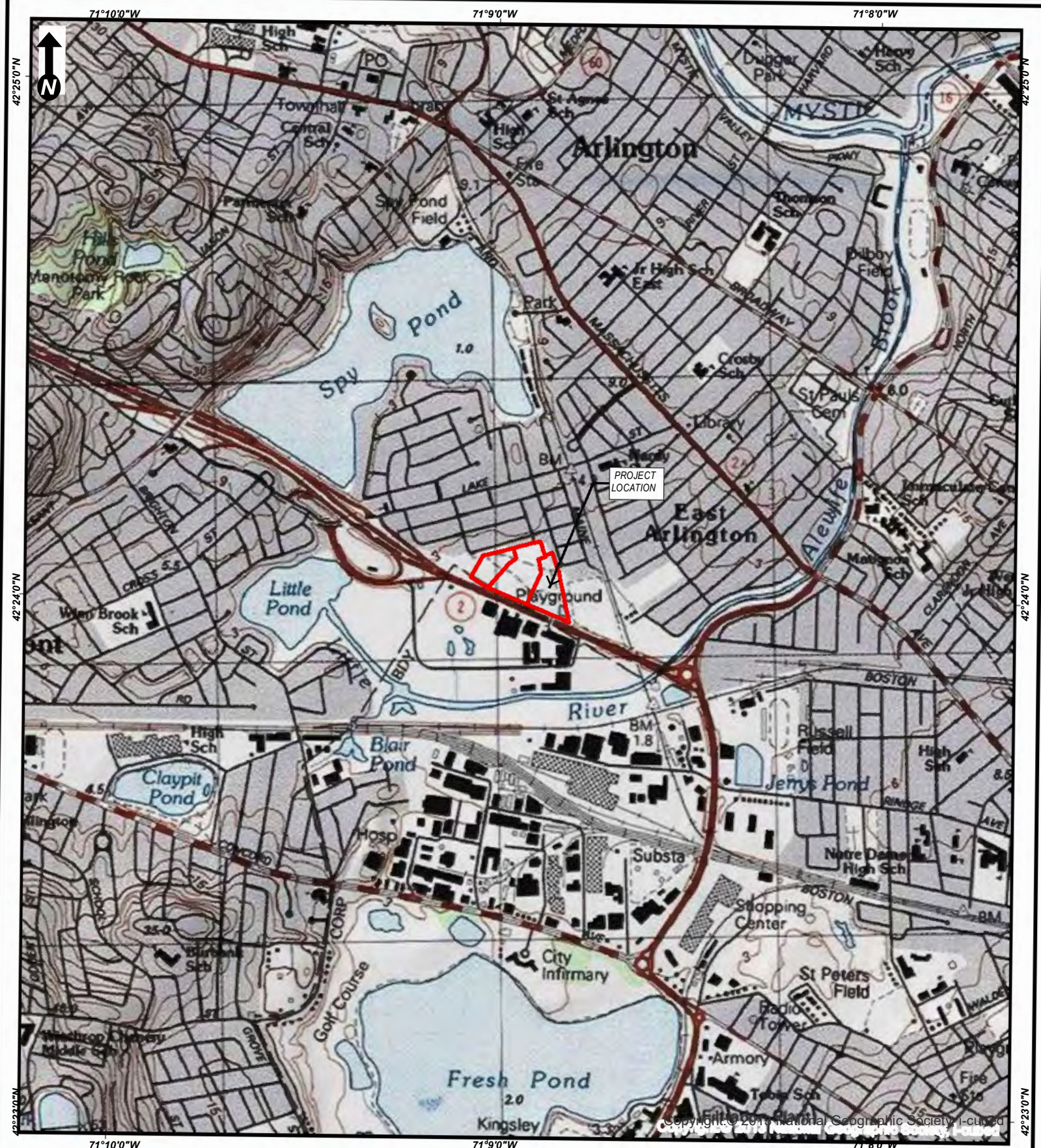
- Meet all performance standards for BLSF established by the WPA.
- Meet all applicable Massachusetts Stormwater Standards.
- Utilize appropriate BMPs to protect wetland resource areas from sedimentation and soil disturbance during Project activities.
- Include 2:1 compensatory flood storage areas as mitigation for impacts to BLSF, at a greater ratio than that required by the WPA.
- Establish a protected open space area of approximately 12 acres, to be protected in perpetuity under a Conservation Easement.

Therefore, Arlington Land Realty, LLC requests that the Arlington Conservation Commission find this proposal adequately protective of the public interests identified in the WPA, and therefore issue an Order of Conditions for the proposed Project as currently designed.

Attachment B

Thorndike Place Residential Community
Arlington, Massachusetts
Notice of Intent

USGS TOPOGRAPHIC MAP
FEMA FIRMETTE
SOILS MAP
SITE DESIGN PLANS - SEE SEPARATE VOLUME
PLANTING PLAN



Scale:
1:24,000
1 inch = 2,000 feet

0 1,000 2,000
Feet

(Page size: 8.5 X 11)

DINOSAUR CAPITAL - THORNDIKE - NOI

USGS Site Location Map
Arlington, MA

Source: 2013
National Geographic
Society, i-cubed

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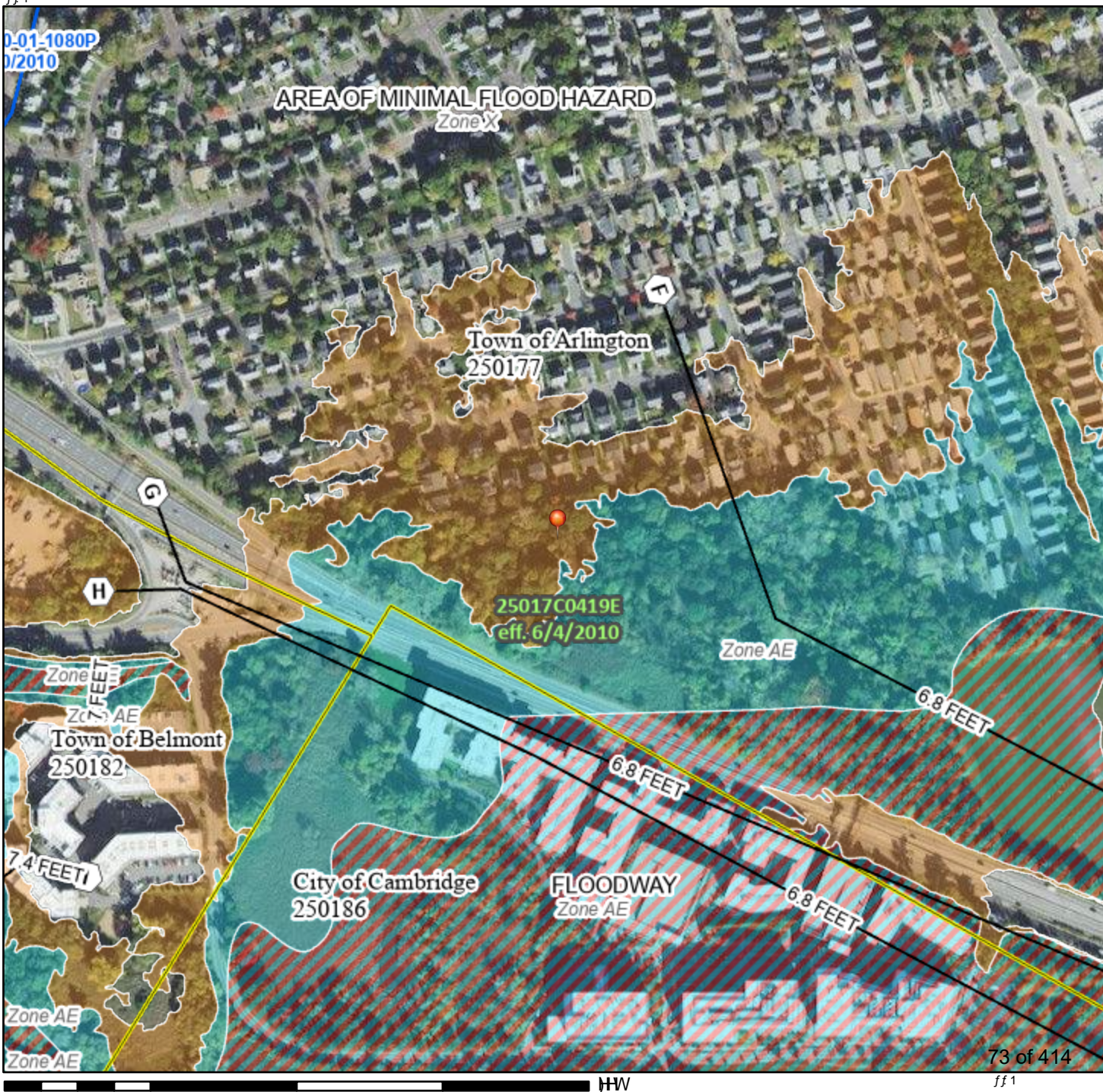
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- ☒ ~~QPS-G~~

74HSLQGLVSDHGRQWKHESLVDDSSURLBWH
SLQVVOHFHMGGEWKHXJDOGRHQRVUHSJH
DDDWKRLWDMLYHSJSHJWOFFDMLRQ

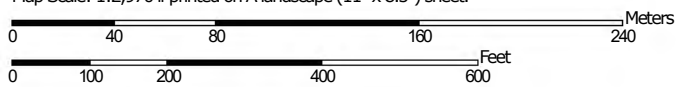
7KLVBSFRLH/ZWKJ/VWDDGUG/IRUWKHXHR
GJJDWOIORGBS/LILWLVRWRYRGD/GHFULBGEORZ
7KHEDBSVRDRLH/ZWKJ/VEDHBS
DFXUD/VWDDGUG/

74H10RGRKQJGLGRUBWLRLVGHULYHGGLUHWOWIURRWKH
DWRKULVDWMLYKZEVLUYLH/FUJYLGHGEJL7LVB
ZV/HUHWHGGR **DV \$** DOGGRHVQRV
UHOHFW RQOQH/RU QROQFQWVWVHDXQV WRWVKV/GDWHDOG
WLPJ 74H10DGGHIFVLYHLGRUBWLRLBQRQKHU
BFFPJ VSHVHGGEQZCQDWRHY WLPJ

7KLVBSLBHLYRGLIWKHQRURUHRWKHIROORZQJES
HOFQWVGRQRVDSBU EMBLSLBHU IORGRQHOOFHV
OHNGV VOOHEDV BSFUHFWLQGRQWV HFWLGLQGLLHV
)SSQHO QBU DQG)SHIFWLYHCDVH OSLBHVIRU
XOBSGDGXRGLQLJGDUHDVROQRV EHXVGRU
UHOODVRSUSRVH



Soil Map—Middlesex County, Massachusetts



**Natural Resources
Conservation Service**


Web Soil Survey
National Cooperative Soil Survey

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8/10/2023
Page 1 of 3


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts

Survey Area Data: Version 22, Sep 9, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	3.8	23.4%
603	Urban land, wet substratum	2.2	13.3%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	0.0	0.2%
655	Udorthents, wet substratum	10.2	63.1%
Totals for Area of Interest		16.1	100.0%

Attachment C

Thorndike Place Residential Community
Arlington, Massachusetts
Notice of Intent

SITE PHOTOGRAPHS



Photo #1: View of wetland within the Project parcel.



Photo #2: View of wetland areas within the Project parcel.



Photo #3: View of Project parcel, currently in use as a homeless encampment. Trash and scrap metal is being dumped in wetlands and adjacent upland areas.



Photo #4: View of scrap bicycles dumped within the project parcel.



Photo #5: View of trash dumping within wetlands on the Project parcel.



Photo #6: View of wetland within the Project parcel.



Photo #7: View of wetland within the Project parcel.



Photo #8: View of site conditions within the Project parcel, with existing houses on Dorothy Street visible in the background.

Attachment D

Thorndike Place Residential Community
Arlington, Massachusetts
Notice of Intent

CERTIFIED LIST OF ABUTTERS
NOTIFICATION TO ABUTTERS



Office of the Board of Assessors
Robbins Memorial Town Hall
Arlington, MA 02476
(781) 316-3050
Assessors@town.arlington.ma.us

Certified Abutters List

Date: August 16, 2023

Subject Property ID & Subject Property Address [CONJOINED]:

13-12-5.A -- 0 Concord Turnpike
14-2-5 0 -- Thorndike Street Extension
14-2-8 -- 0 Concord Turnpike
16-8-2 -- 0 Dorothy Road
16-8-3 -- 0 Dorothy Road
16-8-4 -- 0 Dorothy Road
16-8-5 -- 0 Dorothy Road
16-8-6 -- 0 Dorothy Road
16-8-7.A -- 0 Dorothy Road
16-8-8 -- 0 Concord Turnpike
17-5-6.A -- 0 Concord Turnpike

Search Distance: 100 Feet [CONSERVATION]

The Board of Assessors certifies the names and addresses of requested parties in interest, all abutters to the above listed parcels [Conjoined] within 100 feet.



ABUTTERS LIST

Date: August 16, 2023

Subject Property ID & Subject Property Address:

13-12-5.A 0 Concord Turnpike

14-2-5 0 Thorndike Street Extension

14-2-8 0 Concord Turnpike

16-8-2 0 Dorothy Road

16-8-3 0 Dorothy Road

16-8-4 0 Dorothy Road

16-8-5 0 Dorothy Road

16-8-6 0 Dorothy Road

16-8-7.A 0 Dorothy Road

16-8-8 0 Concord Turnpike

17-5-6.A 0 Concord Turnpike

Search Distance: 100 Feet - Conservation

CONJOINED TO CREATE ONE PARCEL

					MALING ADDRESS			
Parcel ID:	Property Location	Owner 1	Owner 2	Mailing Address 1	Mailing Address 2	Town	State	Zip
13.A-11-53.1	53 DOROTHY RD UNIT 1	LYTE ELAINE T		53 DOROTHY ROAD UNIT 1		ARLINGTON	MA	02474
13.A-11-53.2	53 DOROTHY RD UNIT 2	SHOESMITH WILLIAM CHARLES	SHOESMITH SUZANNE MEDEIROS	53 DOROTHY RD UNIT 2		ARLINGTON	MA	02474
13.A-12-52	52 DOROTHY RD	CURIEL RAFAEL E	GARCIA-CURIEL CARMEN S	52 DOROTHY RD		ARLINGTON	MA	02474
13.A-12-54	54 DOROTHY RD	GU SHITONG	LI HANYUE	54 DOROTHY RD		ARLINGTON	MA	02474
13.A-6-13	13-15 EDITH ST UNIT 13	STARR EMMA L		13 EDITH ST		ARLINGTON	MA	02474
13.A-6-15	13-15 EDITH ST UNIT 15	HE BINGQING		3410 MONTGOMERY DR	APT 121	SANTA CLARA	CA	95054
13.A-6-7	14 OSBORNE RD UNIT 2	PLINER ANITA J		14 OSBORNE RD #2		ARLINGTON	MA	02474
13.A-6-8	16 OSBORNE RD UNIT 1	MCCLOAT MATTHEW THOMAS	HOFFMANN TALYA SELBY	16 OSBORNE RD #1		ARLINGTON	MA	02474
13.A-9-1	43 BURCH ST UNIT 1	BROWN DAVID		43 BURCH ST UNIT 1		ARLINGTON	MA	02474
13.A-9-2	43 BURCH ST UNIT 2	MILLER PAMA R/TRUSTEE	PAMA R MILLER REVOCABLE TRUST	PO BOX 156		ARLINGTON	MA	02476
13-12-1	40-42 DOROTHY RD	HOUSING CORP OF ARLINGTON		252 MASS AVE		ARLINGTON	MA	02474
13-12-2	44-46 DOROTHY RD	IRVING COLETTE ETAL- #44	SOLLER JEFFREY ETAL TRS - #46	44-46 DOROTHY RD	CONDO CONVERSION	ARLINGTON	MA	02474
13-12-3	48-50 DOROTHY RD	MORRISON MELISSA		108 TOON RD		HARVEST	AL	35749
13-12-5.A	0-LOT CONCORD TPKE	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
13-6-5	17-19 EDITH ST	PLUCK FRANK &	COOGAN BRID	17 EDITH STREET		ARLINGTON	MA	02474
13-6-6	18-20 OSBORNE RD	PAVONE DONNA/ TRUSTEE	18 OSBORNE ROAD REALTY TRUST	18 OSBORNE RD		ARLINGTON	MA	02474
13-9-1	24-26 DOROTHY RD	MOURA ROBERT J	WHITE RICHARD M & DIANE	24 DOROTHY RD		ARLINGTON	MA	02474
13-9-2	28-30 DOROTHY RD	COLGAN CATHERINE E	LINDSAY SUSAN J	28 DOROTHY ROAD		ARLINGTON	MA	02474
13-9-3	32-34 DOROTHY RD	DOBRUSHKIN JEANETTE E TRUSTEE	JEANETTE E DOBRUSHKIN LIVING	32 DOROTHY ROAD		ARLINGTON	MA	02474
13-9-4	36-38 DOROTHY RD	GILDERS ANDREW		38 DOROTHY RD		ARLINGTON	MA	02474
13-9-6	47 BURCH ST	GRYAN GARY P & ANITA P		47 BURCH ST		ARLINGTON	MA	02474
13-9-7.A	51 BURCH ST	BROWN MICHEAL ANDREW		51 BURCH STREET		ARLINGTON	MA	02474
14.A-1-84	84 MARGARET ST UNIT 84	HOULE MICHAEL S	UCCI ALLISON M	86 MARGARET ST		ARLINGTON	MA	02474
14.A-1-86	86 MARGARET ST UNIT 86	HOULE MICHAEL S		86 MARGARET ST UNIT 86		ARLINGTON	MA	02474
14.A-2-10	10-12 EDITH ST UNIT 10	ROONEY ELIZABETH M	HAKIM GEORGE MICHAEL	10 EDITH ST		ARLINGTON	MA	02474
14.A-2-12	10-12 EDITH ST UNIT 12	PANG RUILIN	HE JING	4967 DONALD AVE		RICHMOND HEIGHTS	OH	44143

ABUTTERS LIST**Date:** August 16, 2023**Subject Property ID & Subject Property Address:**

13-12-5.A 0 Concord Turnpike

14-2-5 0 Thorndike Street Extension

14-2-8 0 Concord Turnpike

16-8-2 0 Dorothy Road

16-8-3 0 Dorothy Road

16-8-4 0 Dorothy Road

16-8-5 0 Dorothy Road

16-8-6 0 Dorothy Road

16-8-7.A 0 Dorothy Road

16-8-8 0 Concord Turnpike

17-5-6.A 0 Concord Turnpike

Search Distance: 100 Feet - Conservation**CONJOINED TO CREATE ONE PARCEL**

Parcel ID:	Property Location	Owner 1	Owner 2	MALING ADDRESS				
				Mailing Address 1	Mailing Address 2	Town	State	Zip
14-2-1	2-4 EDITH ST	GRIFFITH JENNIFER L		4 EDITH STREET		ARLINGTON	MA	02474
14-2-2	6-8 EDITH ST	OSMER JOHN E & ISIDORA	LIFE ESTATE	6 EDITH ST		ARLINGTON	MA	02474
14-2-4	14-16 EDITH ST	EDITH STREET HOLDINGS LLC		200F MAIN ST	UNIT 352	STONEHAM	MA	02180
14-2-5	0-LOT THORNDIKE ST EXT	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
14-2-6	0-LOT THORNDIKE ST EXT	TOWN OF ARLINGTON PARK		730 MASS AVE		ARLINGTON	MA	02476
14-2-7	0-LOT THORNDIKE ST EXT	TOWN OF ARLINGTON PARK		730 MASS AVE		ARLINGTON	MA	02476
14-2-8	0-LOT CONCORD TPKE	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
14-3-1	0-LOT CONCORD TPKE	BEL ALEWIFE LLC	C/O EATON VANCE MANAGEMENT	ATTN: REIG	2 INTERNATIONAL PL	BOSTON	MA	02110
15-3-1.A	0-LOT THORNDIKE ST EXT	TOWN OF ARLINGTON PARK		730 MASS AVE		ARLINGTON	MA	02476
15-4-1.A	0-LOT CONCORD TPKE	BHX LLC/TRUSTEE	ACORN PARK HOLDINGS RLTY TRUST	116 HUNTINGTON AVE	STE 600	BOSTON	MA	02116
16.A-10-23	23 LITTLEJOHN ST	CHANG JUSTIN	LI JOYCE	23 LITTLEJOHN ST		ARLINGTON	MA	02474
16.A-10-25	25 LITTLEJOHN ST	FARD ARASH JALAL ZADEH	MOUSAVI SAHAR SADJADIAN	25 LITTLEJOHN ST		ARLINGTON	MA	02474
16.A-6-1	75 DOROTHY RD UNIT 1	LACY-HULBERT ADAM ETAL/ TRS	LACY-HULBERT & STUART LIVING	7745 BAGLEY AVE NORTH		SEATTLE	WA	98103
16.A-6-2	73 DOROTHY RD UNIT 2	AUGOOD SARAH J TRUSTEE	SARAH J AUGOOD LIVING TRUST	73 DOROTHY RD UNIT 2		ARLINGTON	MA	02474
16.A-6-57.1	57 DOROTHY RD UNIT 1	SUAREZ ELIZABETH GONZALEZ		101 VARNUM ST		ARLINGTON	MA	02474
16.A-6-57.2	57 DOROTHY RD UNIT 2	STRAUB DEREK		57 DOROTHY RD UNIT 2		ARLINGTON	MA	02474
16.A-6-61	61-63 DOROTHY RD UNIT 61	GELLER JEFFREY C &	GELLER GABRIELLE JONES	61 DOROTHY RD		ARLINGTON	MA	02474
16.A-6-63	61-63 DOROTHY RD UNIT 63	LINDHOLM JEFFREY C & AKIKO S	TRS/ AKIKO SADAHIRO LINDHOLM T	63 DOROTHY RD		ARLINGTON	MA	02474
16.A-6-65	65 DOROTHY RD UNIT 65	CURIEL RAFAEL E	GARCIA-CURIEL CARMEN S	52 DOROTHY RD		ARLINGTON	MA	02474
16.A-6-67	67 DOROTHY RD UNIT 67	JOHNSON STEVEN G ETAL/ TRS	67 DOROTHY ROAD NOMINEE TRUST	67 DOROTHY RD		ARLINGTON	MA	02474
16.A-6-69	69 DOROTHY RD	JETTE ALFRED & DIANE U/ TRS	JETTE REVOCABLE TRUST	69 DOROTHY RD		ARLINGTON	MA	02474
16.A-6-71	71 DOROTHY RD	JIANG BAIREN	YANG SIYU	71 DOROTHY RD		ARLINGTON	MA	02474
16.A-6-79	79 DOROTHY RD	LEVESQUE ADAM &	FRANKL RANDI VERA	79 DOROTHY RD		ARLINGTON	MA	02474
16.A-6-81	81 DOROTHY RD UNIT 81	XU JIN		81 DOROTHY RD		ARLINGTON	MA	02474
16.A-6-83	83-85 DOROTHY RD UNIT 83	LIU SHIH-YUAN	LIU YEN-HSI	83 DOROTHY RD		ARLINGTON	MA	02474
16.A-6-85	83-85 DOROTHY RD UNIT 85	GIANOLIO DIEGO A		85 DOROTHY RD		ARLINGTON	MA	02474
16-10-1	54 MOTT ST	TASHJIAN MARY & ROBERT M/TR	MARY TASHJIAN 2014 REVOCABLE	7111 HEATHER DR		LYNNFIELD	MA	01940

ABUTTERS LIST**Date:** August 16, 2023**Subject Property ID & Subject Property Address:**

13-12-5.A 0 Concord Turnpike

14-2-5 0 Thorndike Street Extension

14-2-8 0 Concord Turnpike

16-8-2 0 Dorothy Road

16-8-3 0 Dorothy Road

16-8-4 0 Dorothy Road

16-8-5 0 Dorothy Road

16-8-6 0 Dorothy Road

16-8-7.A 0 Dorothy Road

16-8-8 0 Concord Turnpike

17-5-6.A 0 Concord Turnpike

Search Distance: 100 Feet - Conservation**CONJOINED TO CREATE ONE PARCEL**

					MALING ADDRESS			
Parcel ID:	Property Location	Owner 1	Owner 2	Mailing Address 1	Mailing Address 2	Town	State	Zip
16-10-2	50 MOTT ST	VISWANATHAN SRINIVAS R &	VISWANATHAN VASANTHI S	50 MOTT ST		ARLINGTON	MA	02474
16-10-4	29 LITTLEJOHN ST	DE LEO JOHN--TRUSTEE	THE DELEO FAMILY TRUST	65 SPY POND LANE		ARLINGTON	MA	02474
16-6-10	42 MOTT ST	WENGER RICHARD--ETAL	WENGER-WYSE SARA	42 MOTT ST		ARLINGTON	MA	02474
16-6-11.A	24 LITTLEJOHN ST	MEDWAR LINDA M/ETAL	VANDERLINDEN DONNA J	24 LITTLEJOHN STREET		ARLINGTON	MA	02474
16-8-1	58-58A DOROTHY RD	MAGLITTA JOHN C & MARIA M		6 BLACKSTONE LN		SOUTH GRAFTON	MA	01560
16-8-2	0-LOT DOROTHY RD	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
16-8-3	0-LOT DOROTHY RD	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
16-8-4	0-LOT DOROTHY RD	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
16-8-5	0-LOT DOROTHY RD	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
16-8-6	0-LOT DOROTHY RD	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
16-8-7.A	0-LOT DOROTHY RD	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
16-8-8	0-LOT CONCORD TPKE	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116
17-5-3	66 MOTT ST	WRIGHT GEOFFREY L/TRUSTEE	WATSON JENNIFER E/TRUSTEE	66 MOTT STREET		ARLINGTON	MA	02474
17-5-4	62 MOTT ST	COSTA MANUEL R & ROBIN A	TRS/MRC REALTY TRUST	62 MOTT ST		ARLINGTON	MA	02474
17-5-5	58 MOTT ST	FIORE JOSEPH A & ELSIE C		58 MOTT ST		ARLINGTON	MA	02474
17-5-6.A	0-LOT CONCORD TPKE	ARLINGTON LAND REALTY LLC	c/o MUGAR ENTERPRISES INC	222 BERKELEY ST. SUITE 1450		BOSTON	MA	02116



Abutter Notification

Notification to Abutters Under the Massachusetts Wetlands Protection Act and Arlington Wetlands Protection Bylaw

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the Arlington Wetlands Protection Bylaw, you are hereby notified of the following:

The Conservation Commission will hold a virtual public meeting using Zoom, on Thursday, September 21, 2023, at 7:00 PM in accordance with the provisions of the Mass. Wetlands Protection Act (M.G.L. Ch. 131, s. 40, as amended), the Town of Arlington Bylaws Article 8, Bylaw for Wetland Protection, and in accordance with the Governor's Order Suspending Certain Provisions of the Open Meeting Law, G. L. c. 30A, § 20 relating to the COVID-19 emergency, for a Notice of Intent from Arlington Land Realty, LLC, for a new age-restricted multi-family housing development at Dorothy Road near its intersection with Littlejohn Street, within Bordering Land Subject to Flooding (BLSF) and 100 ft Wetland Buffer Zone, on Assessor's Property Maps/Lots: 17-6-6A; 16-8-8; 16-8-2; 16-8-3; 16-8-4; 16-8-5; 16-8-6; 16-8-7A; 13-12-5A; 14-2-8; and 14-2-5. Please refer to the Commission's online meeting agenda for specific Zoom meeting access information.

A copy of the application and accompanying plans are available by request by contacting the Arlington Conservation Agent at 781-316-3229 or dmorgan@town.arlington.ma.us. For more information call the applicant's representative Dominic Rinaldi (BSC Group), at (617) 896-4386, or the Arlington Conservation Commission at 781-316-3229, or the DEP Northeast Regional Office at 978-694-3200.

NOTE: Notice of the Public Hearing will be published at least five (5) business days in advance in *The Arlington Advocate* and will also be posted at least 48 hours in advance on the Arlington Town Hall website.

The anticipated meeting information for your hearing is:

Date:

Thursday, September 21, 2023

Time:

7:00 PM

Meeting times may be subject to change, so please check the agenda schedule on the Arlington Conservation Commission webpage (<https://www.arlingtonma.gov/town-governance/boards-and-committees/conservation-commission/agendas-minutes>), or contact the Commission at 781-316-3229, prior to attending.

Affidavit of Service

(Please return to Conservation Commission)

I, Dominic Rinaldi, being duly sworn, do hereby state as follows: on September 6, 2023, I mailed a "Notification to Abutters" in compliance with the second paragraph of Massachusetts General Laws, Chapter 131, s.40, the DEP Guide to Abutter Notification dated April 8, 1994, and the Arlington Wetlands Protection Bylaw, Title V, Article 8 of the Town of Arlington Bylaws in connection with the following matter:

[Brief description of work and address of work.]
The proposed project is a multi-family housing development consisting of twelve (12) ownership units contained within six (6) duplex buildings, and 124-unit senior living residential apartment units located within a single residential building located south of Dorothy Street in Arlington, MA. Impacts are proposed within BLSF and 100-ft Buffer Zone to BVW.

The form of the notification, and a list of the abutters to whom it was provided and their addresses, are attached to this Affidavit of Service.

Signed under the pains and penalties of perjury, this 6th day of Sept, 2023.



Name

Attachment E

Thorndike Place Residential Community
Arlington, Massachusetts
Notice of Intent

STORMWATER REPORT -SEE SEPARATE VOLUME

Attachment F

Thorndike Place Residential Community
Arlington, Massachusetts
Notice of Intent

COMPREHENSIVE PERMIT

Decision on Application for Comprehensive Permit
Arlington Land Realty, LLC
Off Dorothy Road, Arlington, MA
November 22, 2021
Page 1 of 74

TOWN CLERK'S OFFICE
11/22/2021 11:30 AM
2021 DEC-1 PM 3:30

RECEIVED

TOWN OF ARLINGTON
Zoning Board of Appeals
730 Massachusetts Avenue
Arlington, MA 02476

DECISION ON APPLICATION FOR COMPREHENSIVE PERMIT
G.L. c. 40B, §§ 20-23

APPLICANT: ARLINGTON LAND REALTY, LLC ("Applicant")
PROPERTY: Off Dorothy Road and Parker Street (the "Property")
ASSESSORS' MAP: Assessors Parcels 17-6-6A, 16-8-8, 16-8-2, 16-8-3, 16-8-4,
16-8-5, 16-8-6, 16-8-7A, 13-12-5A, 14-2-8 and 14-2-5
DEVELOPMENT NAME: Thorndike Place
DATE: November 22, 2021

I. PROCEDURAL HISTORY

1. An application filed by the Applicant for a Comprehensive Permit pursuant to G. L. c. 40B, §§20-23 was received by the Town of Arlington Zoning Board of Appeals ("Board") on or about August 31, 2016 ("Application"). As originally submitted, the Application proposed the development of twelve (12) home ownership units in six (6) duplex-style structures, and two hundred and seven (207) rental units in a single four-story multifamily structure, for a total of two hundred and nineteen (219) units located at the Property (the "Project").
2. The Board's public hearing on the Application was duly opened on September 26, 2016. On October 6, 2016, the Board submitted a notification to the Applicant pursuant to 760 CMR 56.03(8) stating it had determined that the Town met the 1.5% Land Area Minimum Safe Harbor. On October 21, 2016, the Applicant appealed the Board's determination to the Department of Housing and Community Development ("DHCD"). On November 17, 2016, the DHCD issued a decision ruling that the Board's Safe Harbor notification was in error, and determining that no such safe harbor was applicable. The Board timely appealed this decision to the Housing Appeals Committee ("HAC"). After a *de novo* hearing, on October 15,

2019, the HAC issued a decision upholding the determination of the DHCD, and remanding the matter back to the Board. At the request of the Applicant, the Board's hearing was resumed on December 10, 2019. At the December 10, 2019 hearing, the Applicant requested a further continuance of public hearings until April 14, 2020 to present updated plans in advance thereof.

3. On or about March 19, 2020, the Applicant provided updated preliminary site plans prepared by BSC Group and an updated set of preliminary architectural plans prepared by GreenStaxx. However, due to the onset of the COVID-19 pandemic, the Board did not resume the public hearing until August 25, 2020, at which time all further sessions of the public hearing were conducted remotely pursuant to Governor Baker's March 12, 2020, Order Suspending Certain Provisions of the Open Meeting Law, G.L. c. 30A, §18, which allows for persons to attend and participate via Zoom. After the expiration of the Governor's Order, "An Act Extending Certain COVID-19 Measures Adopted During the State of Emergency" was signed into law, extending those same provisions until April 1, 2022. Subsequent sessions of the public hearing were held on October 13, 2020, November 24, 2020, December 8, 2020, December 22, 2020, January 26, 2021, February 16, 2021, March 11, 2021, April 8, 2021, May 13, 2021, June 10, 2021, June 29, 2021, August 3, September 9, 2021, October 5, 2021, and October 20, 2021. The public hearing was closed on October 21, 2021.
4. During the public hearing, the Applicant was assisted primarily by its authorized representatives Gwen Noyes and Arthur Klipfel of Oaktree Development / GreenStaxx; its counsel Stephanie Kiefer of Smolak and Vaughan, LLP; its civil engineers John Hession, P.E., and the BSC Group; its traffic engineer Scott Thornton, P.E., of Vanasse and Associates, Inc. ("VAI"); its architect Scott Vlasik, of Bruce Ronanyne Hamilton Architects; and its housing consultant, Robert Engler of S.E.B. The Applicant also was represented within the public hearings by Ambrose J. Donovan, P.E., LSP of McPhail Associates LLC and senior housing management consultant, Alan Zimlicki, of ASZ Associates.
5. The Board utilized the services of its peer review engineers, BETA Group, Inc., with Marta Nover, Julia Stearns, Todd Undzis, P.E., William McGrath, P.E., and Laura Krause, Senior Environmental Scientist, handling civil engineering and wetlands, and Greg Lucas, P.E., PTOE, Tyler de Ruiter, P.E., PTOE, and Dennis Flynn, P.E., PTOE handling traffic. The Board also utilized the services of Town Counsel Douglas Heim, Esq., Director of Planning and Community Development Jennifer Raitt, Senior Planner Kelly Lynema, Senior Transportation Planner Daniel Amstutz, Town Engineer Wayne Chouinard, and other town staff. The Board was also represented during the course of the hearing by Special Town Counsel Jonathan Witten, Esq. of KP Law, and Paul Haverty, Esq., of Blatman, Bobrowski

& Haverty, LLC as its Chapter 40B technical consultant through a grant from the Massachusetts Housing Partnership.

6. The Project site consists of a 17.7-acre parcel of land off Dorothy Road, and is located between Concord Turnpike (Route 2) to the south and west and residential neighborhoods to the north and east of the Property. The Property is also bordered to the east by Burch Street and the Town of Arlington Thorndike Park. The Property is sometimes referred to as the "Mugar Property", named after the longtime property owning family
7. The Property is located within the Planned Unit Development (PUD) Zoning District. The abutting residential properties are zoned primarily as within the Two-Family (R-2) Zoning District, with the exception of the residential properties on the western side of Littlejohn Road, which are within the Single-Family (R-1) Zoning District. Thorndike Park, located to the east of the Property is in the Open Space (OS) Zoning District.
8. Of the total Project site, approximately 13.7 acres are within the regulatory floodplain. The portion of the Property to be developed as the Project is an approximately 5.6 acre parcel, along the northern / central area of the Property, with limited areas of floodplain along the southern and eastern portions of the designated area of development.
9. The Applicant provided various materials, reports, studies, and revised plans throughout the course of the public hearing on the Application. While, as described below, the design has been revised several times during the public hearing process, the final proposed Project includes 6 duplex buildings / 12 ownership units along Dorothy Road and a 124-unit, four-floor senior living rental building behind the duplex units, together with accessory parking, landscaping, and access drives (the "Project"). The final proposed Project is as depicted on the "Approved Plans" as listed in Condition A.2.
10. Within the public hearing, during fall 2020, the Applicant submitted revisions to the Project's originally-proposed layout responsive to comments made by the Board's peer review consultants at BETA Group and by the Arlington Conservation Commission, seeking to reduce impacts within wetland resource areas and buffer thereto.
11. Thereafter, the Applicant submitted a revised set of plans and supplemental materials to the Board on November 3, 2020. The revised proposal reduced the total number of units in the Project from 219 units to 176 units. This revision also eliminated the six (6) duplex structures originally proposed by the Applicant, in favor of an all-rental development in a single structure, which was moved northerly on the Property toward Dorothy Road.

12. On January 21, 2021, Applicant's engineers submitted supplemental plans and documentation to the ZBA, including a fiscal analysis; BSC Response to BETA Group and the Town Engineer's stormwater comments; an updated stormwater report; revised Site Plan Sheets C-100, C-101, C-105, C-200, C-203; a revised Wetland Delineation Memorandum and responses to BETA's traffic peer review. Subsequent to the Board's January 26, 2021, public hearing, the Applicant proposed further adjustments to the architecture of the building.
12. In April 2021, the Board requested the Applicant to consider reintroduction of the ownership duplex units within the proposed development. Thereafter, the Applicant responded to the Board's request, such that the building layout remained within the plan's perimeter access path, but the rental building was reduced in size to allow reintroduction of the six (6) duplex buildings, consisting of twelve (12) ownership units. Within this revised concept, the Applicant modified the rental building to decrease the size of the same and to decrease the number of units such that the building was designed to accommodate 124 age-restricted housing units, consisting of a mix of studio, one- and two-bedroom units together with ancillary common spaces associated with an independent living residence for seniors.
13. Between July and September 2021, the Applicant provided additional detail and assessment of the revised concept project plans.
14. During the extensive public hearing process, there was significant public input, including broad, strong opposition from local residents, the Select Board, and the Town's State House delegation. The Board heard questions and comments from abutters and other interested persons throughout the hearing process. The Board also heard significant input from town departments, including the Arlington Redevelopment Board, the Conservation Commission, the Department of Planning and Community Development, the Transportation Advisory Committee, Select Board, and Engineering Division. The Board also received significant input and expressions of opposition from the Arlington Land Trust and the Mystic River Watershed Association, both independent local non-profits.

II. JURISDICTIONAL FINDINGS

15. The Applicant has demonstrated its eligibility to submit an application for a Comprehensive Permit to the Board, and the development fulfills the minimum project eligibility requirements set forth in 760 CMR 56.04(1) as follows:
 - a. The Applicant is a limited liability company, and has indicated in its application that it will conform to the limited dividend requirements of G. L. 40B, §§ 20-23, thus establishing it is a limited dividend entity. The Applicant has a principal address of 222 Berkley Street, Boston, MA 02116.

- b. The Applicant has received a written determination of Project Eligibility from MassHousing dated December 4, 2015, under the New England Fund Program, a copy of which was provided to the Board with the original application. The Board subsequently contacted MassHousing regarding the changes to the proposed development, asking for a determination pursuant to 760 CMR 56.04(5). MassHousing submitted a written determination dated March 23, 2021, determining that the changes to the development, including the removal of the duplex development, would not constitute a substantial change pursuant to 760 CMR 56.04(5). The Board reserves all of its rights regarding this determination.
 - c. The Applicant provided deeds dated September 8, 2015, recorded in the Middlesex South in Book 1479, at Page 27. Thus, the Applicant has shown evidence of site control sufficient to qualify as an applicant for a Comprehensive Permit.
 - d. The Applicant has agreed to execute a Regulatory Agreement that limits its annual distributions in accordance with G. L. c. 40B and the regulations (760 CMR 56.00 et seq.) and guidelines adopted thereunder by DHCD.
16. The Town of Arlington ("Town") did not meet the statutory minima set forth in G. L. c. 40B, § 20 or 760 CMR 56.03(3) to 56.03(7) at the time the original application was filed, except as noted below:
- a. At the time of the filing of the Application, the number of low or moderate income housing units in the Town constituted 5.64% of the total year-round housing units in the Town, based on the most recent publicly available copy of the DHCD Subsidized Housing Inventory, dated May 13, 2016. Thus, the Town does not meet the ten percent (10%) statutory minimum.
 - b. The Board has asserted a claim that there are existing affordable housing units that are on sites that comprise more than one and one half percent (1.5%) of the total land area of the Town that is zoned for residential, commercial or industrial use (excluding land owned by the United States, the Commonwealth of Massachusetts, or any political subdivision thereof). The Board timely asserted this claim pursuant to 760 CMR 56.03(8). The Applicant appealed this claim to the Department of Housing and Community Development, which issued a decision dated November 17, 2016, reversing the Board's Safe Harbor determination. The Board appealed this decision to the Housing Appeals Committee. On October 15, 2019, the Housing Appeals Committee upheld the decision of the Department of Housing and Community Development. As this decision was not a final decision, the Board was not able to pursue an

appeal pursuant to G. L. c. 30A, § 14 at that time. The Board reserves its rights regarding this Safe Harbor claim.

- c. The granting of this Comprehensive Permit will not result in the commencement of construction of low or moderate income housing units on a site comprising more than three tenths of one percent of land area in the Town or ten acres, whichever is larger, zoned for residential, commercial or industrial uses (excluding land owned by the United States, the Commonwealth of Massachusetts or any political subdivision thereof) in any one calendar year.
- d. The Town has an approved Housing Production Plan pursuant to 760 CMR 56.03(4), but is not currently within (or eligible for) certification.
- e. The Town has not achieved recent progress toward its housing unit minimum pursuant to 760 CMR 56.03(5).
- f. The Project as originally submitted does not constitute a Large Project pursuant to 760 CMR 56.03(6).
- g. The Applicant's Comprehensive Permit Application does not constitute a Related Application pursuant to 760 CMR 56.03(7).

III. FACTUAL FINDINGS

Location of Project

- 17. The Project is located on a low-lying, undeveloped 17.7 acre parcel of land located between Concord Turnpike (Route 2) to the south and west and single- and two-family residential neighborhoods to the north and east. The Property is bordered on the north by Dorothy Road and on the east by Burch Street and Thorndike Park. The northwest corner of the Property along Dorothy Road is at the intersection with Littlejohn Street. The portion of the Property along Dorothy Road is the 0.2% Annual Chance Flood Hazard Area per the local FEMA Flood Map (#25017C0419E), while the remainder of the Property is within the Special Flood Hazard Area (Zone AE).
- 18. The Property is located within the Planned Unit Development (PUD) Zoning District. In this District, duplex buildings are allowed as of right and a multifamily building is conditionally allowed.
- 19. The Property is located in a neighborhood that has been historically subject to flooding. The Board has received testimony of this historic flooding on and around the Property, a remnant of the "Great Swamp" of Alewife. Much of the Property,

notably its southern portion closest to Route 2 is bordering vegetated wetland, with a pocket of isolated vegetated wetland to the east of the proposed development envelope proposed on the Property.

20. While the Property is approximately 0.7 miles (a 13-minute walk) from the Alewife MBTA station utilizing the Minuteman Bikeway, there is no direct access to the station or the transit-oriented development around it. Vehicular access to the neighborhood in which the Property is located is via Lake Street, one of the most congested thoroughfares in Arlington, and within the neighborhood, on a local road network consisting of narrow, 25-foot wide local roads. The local road network is stressed even in the absence of the Project by the cut-through pressure exerted by the congestion on Lake Street. There is no direct automobile access from the Property to Route 2, nor would such a link be possible due to wetland resource areas along the highway.
21. The location of the Approved Project presents major problems that make reconciling and balancing local needs, including the local need for affordable housing, difficult. In a project as complex and controversial as this one, there are a multitude of local concerns that cannot be discussed one by one. In general, however, major concerns fall into one of several categories:
 - a. The Need for Affordable Housing. The Board rejects the view that there is a natural antagonism between affordable housing and other local concerns. In fact, affordable housing is one of the Town's most important policy goals, and not just a regional need.
 - b. Flooding and Wetlands. The neighborhood of the Approved Project experiences severe and repeated flooding, and much of the Property consists of wetlands subject not only to state regulation but regulation under the Town's bylaws. Both the state and town regulations are administered by the Conservation Commission, which has been deeply involved in the proceedings before the Board.
 - c. Climate Change and Resiliency. The Town has adopted a strong net-zero policy which, among other things, envisions electrification of new construction. At the same time, the location of the Approved Project in an environmentally sensitive area raises serious concerns regarding resiliency and protecting both residents of the Approved Project and neighbors from the effects of more intense storms and other weather events in the future.
 - d. Traffic and Transportation. The Approved Project would be located in an area served by only one arterial roadway, Lake Street, which is severely congested during the morning and peak rush hour. The project's potential impact on the operation of the road system is a significant local concern. Also of concern is

traffic generated by the project, which could undermine safety and quality of life in the existing neighborhood.

- c. **Neighborhood Compatibility.** The Approved Project involves a large building in a uniform, long-established residential neighborhood that is much smaller in scale.
- f. **Construction Impacts.** Construction of the Approved Project will involve bringing large trucks to the site via Lake Street and narrow neighborhood streets. There are substantial local concerns relating to possible tree damage, damage to existing houses, safety, noise, and more. There is also a strong local concern to ensure transparency and cooperation in minimizing the inconveniences that necessarily attend a large project of this size.
- g. **Open Space and Property Management.** The subject property has been neglected over the years and has at times served as a campground for the homeless. The Town has a strong policy in favor of keeping the subject property – or as much of it as possible – as open space as well as ensuring that it is managed appropriately. The Town has strong local concerns relating to the disposition and protection of the so-called Conservation Parcel.

The Board's Findings will address each of these categories of local concern.

The Need for Affordable Housing

- 22. The Board continues to believe that Arlington qualifies for Safe Harbor status pursuant to 760 CMR 56(c)(3)(b)(General Land Area Minimum) and reserves its rights in that regard pursuant to paragraph 16.b above. Nevertheless, the Town falls short of meeting the Town's own goals for affordable housing. One important indication of the shortfall in affordable housing in Arlington is the percentage of low and moderate income units as compared to the state's Subsidized Housing Inventory, which as of the date of the comprehensive permit application was at 5.64%. The Town's current Housing Production Plan (which was approved by the Massachusetts Department of Housing and Community Development on November 7, 2016) states that the Town has 1,121 deed-restricted affordable units, and approximately 5,185 potentially eligible households, many of whom are elderly. The shortage of affordable units in Town is an area of continuing local concern, as is the escalating cost of housing in general.
- 23. The Project, as conditioned herein, will be a meaningful step forward in addressing the lack of affordable rental units in the Town for seniors, as well as the lack of affordable homeownership units. The final proposed Project consists of 12 duplex units housed in six (6) duplex structures, of which 25% of the units (3 units) will be designated as affordable units and subject to a deed rider as required by the

Subsidizing Agency, together with 124 age-restricted (62+) senior residential units in a single, four-floor building, of which 25% of the units (31 units) will be made available for lease to low and moderate income persons. However, the Board recognizes that the actual need for affordable housing is much greater than what's being provided by the proposed Project.

24. The creation of 124 units of senior rental housing, with 25% of such units made affordable to low and moderate income residents, is responsive to the concerns raised in the Arlington Master Plan and its determination that “[c]hanging demographics will result in a growing number of Arlington residents over the age of 65 in coming years. The Town may not be able to accommodate all of its older residents on fixed incomes in the coming years.” *Master Plan*, p.88.

Flooding and Wetlands

25. The Property is located in a neighborhood that is subject to flooding. The southern and eastern portions of the property are largely within the regulatory floodplain. The site has provided flood storage capacity over the years. Still, the August 10, 2015 letter from Nover-Armstrong Associates to Town Counsel noted that “historical reports indicate that flooding occurs beyond the 100-year flood extents shown” by FEMA. The August 15, 2015 letter from the Arlington Conservation Commission to the Select Board noted that “neighborhoods surrounding the Mugar Property have a long history of street and basement flooding during and after storm events” and “Alewife Brook runs ‘backwards’ (away from the Mystic River) during large rain and flood events, which may contribute to flooding of the Property and its neighborhood.”
26. A memorandum prepared in January 2021 by Weston & Sampson on behalf of the Arlington Land Trust noted that “there is concern that developing on the wetland will exacerbate an area that has already experienced extreme flooding events in recent decades.”¹ While the Weston & Sampson report evaluated the prior project design of a 176 multifamily unit project, the Board finds that flooding concerns remain. These concerns relate both to flooding on the property itself and to flooding in the neighborhood north and west of the Property. Neighbors are deeply concerned that development of the Property will exacerbate the flooding that they already experience.
27. In response to the Board’s request, on October 4, 2021, the Applicant’s engineer, John Hession submitted a *Memorandum on Flooding Mitigation Measures*,

¹ Memorandum to Arlington Land Trust from Weston and Sampson (Indira Gosh) (January 20, 2021) at p. 2.

summarizing the evidence in the record on whether the Project would exacerbate the flooding that the surrounding community experiences already. The Board asked its peer consultant, BETA Group, to review the Applicant's conclusions. This *Peer Review – Flood Mitigation Memorandum* was received on October 8, 2021.

- a. The flooding currently experienced on Dorothy Road and Littlejohn Street is so-called localized flooding, which tends to happen after a heavy rain. The intersection of Dorothy and Littlejohn is a low point in the neighborhood with two catch basins at the Dorothy/Littlejohn intersection and two catch basins in the vicinity of 56 and 57 Dorothy Road. These catch basins discharge through a municipal 12" storm drain across the Thorndike Place property to the southeast at Route 2. There was a question raised by the Applicant as to whether the 12" municipal storm drain has adequate capacity to accommodate the localized flow. In any event, only a very small portion of the project area currently drains into those catch basins, and that proportion will be reduced essentially to zero after the project is built. The project is designed in accordance with Massachusetts guidelines to retain all stormwater onsite.² As designed, it will not contribute to the localized flooding that currently is the bane of the neighborhood.
- b. The project area experiences stream flooding as well. Stream flooding is related to the flow from Alewife Brook. The current FEMA designated 100-year elevation on the site is 6.8 feet. (Measurements of elevation are all NAVD 88.) The Thorndike Place project will involve filling certain "Border Lands Subject to Flooding" (BLSF), which would reduce storage capacity and increase the stream-flooding risk. This filling is offset, however, by the creation of new storage to compensate for storage lost to disturbance. The Applicant has agreed to meet the requirement of the Arlington Wetlands Protection Regulations (which are more stringent than state law) for compensatory storage on a 2:1 basis (that is, two units of compensatory storage for every unit of storage lost to filling). By meeting this more stringent standard, the proposed project will not contribute to increased flooding on adjacent or downstream properties.³
- c. The third potential source of flooding is groundwater flooding, or infiltration from water flowing underground. Based on the test pits conducted on November 25, 2020, groundwater on the site is estimated to be at elevation 3.0

²The Project will connect to the Arlington municipal water and sanitary sewer systems. It will not connect to the town's stormwater sewers. The Town Engineer has informed the Board that stormwater and sanitary sewers are not combined in Arlington and that there are no combined sewer overflows (CSOs) anywhere in the town.

³ This has been confirmed by the Town's Peer review consultant, BETA Group, in their September 8, 2021, Comprehensive Permit Civil / Wetland Peer Review #5.

feet. The Applicant has agreed to conduct additional groundwater testing to confirm the seasonal maximum high groundwater elevations on the site, and the Board has included conditions requiring such testing. While there are potential concerns for controlling groundwater flooding on the Property (and the Applicant is addressing those concerns), the Applicant offered testimony from Ambrose Donovan, PE, LSP of McPhail Associates, that the proposed development, including the projection of building foundations below groundwater, would have no impact on the groundwater table in the vicinity of the project.

- d. In a memorandum dated October 8, 2021, the Town's peer consultant, BETA Group, reviewed and concurred with the Applicant's summary of the evidence on flood risk, subject to the gathering of additional data on groundwater elevations. While BETA stresses that the project cannot be expected to improve existing conditions off-site, it agrees that stormwater management associated with the project will not exacerbate them. BETA observes, however, that additional precautions may need to be taken to protect the proposed project itself from groundwater flooding depending on the gathering of additional data on peak-season groundwater elevations.
- e. The project's stormwater management system has been designed to meet and exceed the Massachusetts Stormwater Standards.⁴ In particular, the proposed stormwater runoff rates are equal to or less than existing runoff rates for the 2 through 100-year storm events using NOAA 14+ precipitation data. The use of the NOAA 14+ data exceeds current state requirements, although it conforms to the current practice of the Arlington Conservation Commission and was requested by the Commission and the Board. The Commission stresses that in practice these data reflect current precipitation conditions and do not fully take into account the likelihood that climate change will result in more extreme precipitation conditions in the future.
- f. The Board takes note of the observation of the Applicant's engineer that the construction of the project may provide an opportunity for the Town to clear its existing easement of vegetation and increase the capacity of the municipal stormwater system to reduce the likelihood of localized flooding in the future.

28. In recognition of the strong local interest in protecting wetlands as an environmental resource, the final proposed Project has been designed to provide

⁴ Stormwater Management has been designed in compliance with the Mass Stormwater Management Standards in accordance with 310 CMR 10.05(6)(k) through (q) and defined in detail in the MassDEP Stormwater Management Handbook. The system incorporates best management practices (BMP's) to facilitate total suspended solids (TSS) removal, infiltration and detention of stormwater flows.

compensatory flood storage at a ratio of 2:1 to maintain the amount of flood storage capacity on the Property.

29. The Project will involve limited work within the buffer zone and within floodplain as defined by M.G.L. c.131, §40 and its regulations at 310 CMR 10.00. Accordingly, the Project will be required to obtain an Order of Conditions under the State Wetlands Protection Act ("WPA"). The Project will also comply with the Arlington Wetlands Bylaw, which is more restrictive than the WPA in a number of aspects, and for this reason, most of the Applicant's waiver requests under the Bylaw are being denied by the Board at the request of the Conservation Commission. This Comprehensive Permit contains numerous conditions intended to ensure compliance with the Bylaw.
30. The Project includes 25,310 square feet of temporary disturbance in the locally protected Adjacent Upland Resource Area ("AURA") associated with site grading and compensatory storage creation and approximately 1,206 square feet of pervious walkway within the outer portions of the AURA, together with 623 square feet of disturbance of the outermost 25 feet of AURA associated with a portion of the back wall on the first floor / garage of the senior living building.
31. In its review letter of August 18, 2021, the Conservation Commission confirmed to the Board that "[t]he ACC is satisfied that the proposed Compensatory Flood Storage Area is appropriate for the 2:1 compensatory flood storage[.]"
32. The Project does not directly alter either the bordering vegetated wetland or isolated vegetated wetland delineated on the Property. There are some impacts to portions of the 100-foot AURA associated with the final proposed Project. These mainly come from site grading, compensatory storage, a pervious walking path / fire truck path to the rear of the senior living building as well as a small portion along the southwestern end of the senior living building, which is within the outermost 25 feet of the 100 foot buffer. The Board finds this work within the buffer to be limited in scope and consistent with the local wetlands bylaw, subject to the conditions herein.
33. The Conservation Commission noted that the tree planting and landscaping details proposed by the Applicant are insufficient in light of the site disturbance that the Project will entail. The Board finds that, given the extent of the vegetation proposed to be removed within a resource area (BLSF) and AURA, a Landscape Plan is needed to ensure appropriate revegetation of the site. The Board has required the submission of an appropriate Landscape Plan in the conditions to this Comprehensive Permit.
34. Similarly, the Conservation Commission advises that, if not appropriately mitigated, creation of new compensatory flood storage areas will involve vegetation

removal and grading that can have serious negative environmental impacts. The Board credits the judgment of the Conservation Commission and has adopted conditions requiring an appropriate mitigation plan.

35. The Board finds that the Project, as shown on the Approved Plans avoids alteration of the 25-foot No Disturb Zone to Isolated and Bordering Vegetated Wetlands on the Site as is required under local and state law.

Climate Change and Resiliency

A. Resilience and Response

36. The Board's consideration of stormwater management and flooding must take into consideration the prospect of Climate Change. The Board was told frequently in the public hearings that climate change is not a future threat but a present reality. The Board fully agrees.
37. The Applicant's decision to design its Stormwater Management System based on the NOAA 14+ precipitation data, as the Board and Conservation Commission requested, was a major positive step, and one that went beyond what was required by existing state and local regulations. But as the Commission and several members of the public informed the Board, those data did not anticipate the increase in the size and severity of storms to be expected as global warming continues.
38. The Weston and Sampson Study commissioned by the Arlington Land Trust advocated the use of considerably more pessimistic stormwater projections for the design of the Approved Project's stormwater management system.⁵ Those recommendations go beyond what may be required under either state regulations or those of the Conservation Commission, and the Board is not confident of its authority to impose more stringent requirements under Section 40B. The Board does find, however, that it is likely that the pressure on the stormwater management system will increase with the passage of time, raising significant resiliency concerns.
39. During the hearing process, the Board expressed concerns that climate change will aggravate the historical flooding problem of the area and that climate change will strengthen storms and create more severe precipitation events. Recent data already show heavier rainfall than older data, and the situation will inevitably get worse. Addressing flooding in the era of climate change requires designing, not for the

⁵ Memorandum to Arlington Land Trust from Weston and Sampson (Indira Gosh) (January 20, 2021) at 15.

past, or even the present, but for the future.

40. Sea level rise and storm surge present additional dangers. There is a substantial possibility that the Amelia Earhart Dam between Somerville and Everett will be flanked or overtopped in the next thirty to forty years.⁶ This could lead to reversed flows on the entire Mystic River and all its tributaries, resulting in severe flooding upstream. The risk of this regional catastrophe may not be much influenced by this Project. Here the key issue is whether the project design is sufficient to protect the persons and property of residents of the proposed senior living building and duplexes as well as neighbors.
41. Applicant's revised project design, as approved by this Decision, has included climate resiliency measures, including, *inter alia*, raising the building first floor elevations. Under current Massachusetts law, buildings are to be designed to the 100-year base flood elevation (BFE), which is currently 6.8 feet and the 500-year flood elevation is at 10.75 feet. When the Weston and Sampson report was issued in January 2021, the Applicant had proposed to locate the 176 unit apartment building with the first floor at 13 feet, which Weston and Sampson criticized as insufficient.
42. The Applicant returned to this issue in its proposal for a senior residence building. The elevation of the first floor of the senior living rental building is at Elevation 16 and the first floors of the duplexes along Dorothy Road are at Elevation 12, both above the existing 100 and 500-year base flood elevation and also above the elevations associated with projected sea level rise (SLR) and storm surge (SS) effects under the current standards as well as the 100 year flood under projected 2070 flood elevation modeling. The Cambridge Climate Change Vulnerability Assessment and Cambridge Flood Viewer support this conclusion.
43. The Applicant is proposing a basement level garage in the senior living building at Elevation 6.0 and in the duplexes at Elevation 2.0. Both of these are well below the current BFE. There was considerable concern raised during the Public Hearings in regards to this condition. There was concern expressed for the residents who would need to contend with the flooding and accompanying damage. There was also concern for how such structures could impact the flow of groundwater. The Applicant indicated they would protect the new structures on their Property with appropriate waterproofing to prevent infiltration. Their site engineer provided calculations showing that the imposition of the new basements into the water table would not cause any mounding or raised elevation of groundwater that extended beyond the edge of the Property.

⁶ Id. at pp. 8-9.

B. The Town's Net Zero Policy

44. In February 2021, the Town adopted a Net Zero Action Plan (to reduce greenhouse gas emissions as much as possible and remove or offset any remaining pollution by 2050) after more than a year of study by the Clean Energy Future Committee and extensive public input. The Plan was endorsed by the Select Board on August 9, 2021. Because buildings account for a large portion of the town's greenhouse gas emissions, eliminating on-site fossil fuel consumption is an important town objective under the plan.
45. In a 2021 Special Town Meeting, Arlington's Town Meeting adopted Article 5 - Home Rule Legislation / Bylaw Amendment / Fossil Fuel Infrastructure by a vote of 225-18. Article 5 "authorize[s] and request[s] the Select Board to file Home Rule Legislation to allow the Town of Arlington to regulate fossil fuel infrastructure in new construction and/or major renovation and rehabilitation projects in Arlington for the purposes of reducing greenhouse gas emissions and encouraging renewable energy production and use". Representative Sean Garbally and Senator Cindy Friedman have cosponsored the appropriate bill (H3750), which has been referred to the Joint Committee on Municipalities and Regional Government. The bills were heard by the committee on July 27, 2021. At that hearing, Arlington's Town Manager stressed the importance that the Town attached to fighting climate change in general and to discouraging on-site consumption of fossil fuels in particular.
46. The Applicant has committed to all electric construction for the senior housing building (see Condition C.1(i)(v)), which is responsive to the Town's strong local concern for reducing greenhouse gas emissions and encouraging the use of renewable energy.
47. The Applicant has not taken a position on electrification of the duplex units. The Board hopes, however, that Applicant will approach the duplexes with the same enlightened perspective as it has for the senior housing.

Traffic and Transportation

48. The Approved Project enjoys relatively convenient access to the Alewife MBTA station (0.7 mi), the Minuteman Bikeway (0.4 mi), and to several bus routes (0.3 mi to Route 2, 0.6 mi to Mass. Ave.). The project also is close to several major highways, including the Concord Turnpike (Route 2), Alewife Parkway (Route 16), and Massachusetts Avenue. The proximity of the Minuteman Bikeway provides bikers with access to an extensive network of trails. For pedestrians, it is relatively short walk from the project to the Minuteman Bikeway and thence to the MBTA station and other destinations. The Applicant presented prior

proposals to the Board as a transit-oriented development.

49. In some respects, however, the Approved Project is not pedestrian friendly. While shopping opportunities exist in Fresh Pond and along Massachusetts Avenue, each of those destinations would be a substantial walk, especially for the elderly people who are expected to reside in the senior residential building. The Applicant proposes to address this issue by providing a jitney service not just to the MBTA station but to other destinations in the vicinity. While that is a service to the residents and staff, it will only reduce vehicle trips to the extent that the jitney vehicles are occupied by multiple travelers.
50. The Board has heard a great deal of testimony raising concerns about the traffic that would be generated by the Project. While the final Approved Project is smaller than previous proposals, it is still large in comparison with the relatively low density residential neighborhood in which it would be located. Traffic generation raises two important local concerns: (a) the operation of the already stressed transportation network, and (b) more broadly, the quality of life in the neighborhood.

Effect on the Road Network

51. The Applicant concedes that the Approved Project will have some negative impact on the road network. The Applicant contends, however, that the impact is so small as to be de minimis, and that the Approved Project is in any event, better than earlier proposals.
52. It is plausible, but not certain, that peak-hour traffic generation from the Approved Project would be less than peak hour traffic from the Applicant's prior proposal to build a 172 unit apartment building on this site. The Board's peer-review consultant thought that traffic generation, while a little less on the basis of VAI's projections, would in general be "comparable." The Board, however, is not deciding between one proposal and the other; it is evaluating the Approved Plan, which is the only proposal before it. Thus, the Board must consider whether the Approved Project's impact on the road network is acceptable measured [only] against the "no-build" alternative. This question was addressed by both the Applicant's traffic engineer, Vanasse & Associates, Inc. (VAI), and the Board's peer review consultant, BETA Group (BETA).
53. Predicting the impact of the project on the operation of the road network has three basic steps: (i) defining a study area, (ii) deciding what would happen in the study area if the Approved Project is not built, and (iii) deciding what would happen if the Approved Project is built. In short, the Board must consider background traffic conditions at some point in the future when the project is expected to be operational and then evaluate how much difference the project

makes.

54. While VAI analyzed a number of locations outside the immediate vicinity of the Approved Project, the Board's primary concern with respect to peak hour traffic is Lake Street between Concord Turnpike (Route 2) and Massachusetts Avenue. This is true for several reasons.
- Lake Street, though classified as a "minor arterial," is in fact a major commuting route between those major arteries. Lake Street also provides access to the Hardy School, a K-5 elementary school serving residents of East Arlington, and to Thorndike Field, a heavily used field for sports and recreation activities. The use of Thorndike Field overlaps with the evening commute.
 - During the morning and evening rush hours, Lake Street in the direction of the commuting flow is seriously congested. Additional burdens on already overburdened Lake Street can be expected to cause additional inconvenience, which will affect commuters, neighboring residents, students and their families, and the users of Thorndike Field.
 - Lake Street is also the major road that would be most affected by traffic generated by the Approved Project. All automobile traffic accessing the Project site must travel on Lake Street. Leaving the neighborhood requires a left or right turn on Lake Street, sometimes under very difficult conditions.
 - Lake Street congestion generates cut-through traffic as drivers hope to bypass some stop-and-go traffic by using local streets. At present, local regulations prohibit turns from Lake Street onto Wilson Road, Littlejohn Street or Homestead Road between 7-9 a.m. and 4-7 p.m., Monday-Friday. These regulations are only partially effective as evidenced by testimony from local residents and VAI's traffic counts at those intersections.
55. Due to the coronavirus pandemic, it is difficult to account for "typical" vehicle traffic volumes on Lake Street to support a robust analysis of the traffic impacts that may come from the development. BETA and VAI mutually agreed on the methodology utilized by VAI to adjust the traffic data to account for the presumably temporary traffic decrease associated with the coronavirus pandemic. The method used by VAI to account for the pandemic and seasonal variations in traffic is consistent with professional standards and is credible.
56. Having constructed an estimate of traffic conditions as of 2020, adjusting for the pandemic, VAI needed to go one step further. The Approved Project will not be built and operational for several years. During that time, traffic on

Lake Street is likely to increase, as a result of the general trend of traffic in the region and traffic generated by specific projects nearby that came on line after 2020. To address the expected increase in background, VAI projected traffic volumes to the year 2027.

The No-Build Scenario

57. Lake Street has extensive traffic congestion during morning and evening rush hours, and frequently backs up bumper to bumper during evening rush hour from Massachusetts Avenue onto the Route 2 eastbound off-ramp as well as west of Route 2 on Lake Street back to Cross Street in Belmont.⁷
58. Lake Street carries 1,662 vehicles in the weekday morning peak hour, and 1,351 vehicles in the weekday afternoon peak hour.⁸ Cited volumes represent data collected prior to the coronavirus pandemic, adjusted for growth to an assumed baseline 2020 condition.
59. Intersections along Lake Street experience serious existing operational deficiencies. Lake Street has three traffic signals between Route 2 and Massachusetts Avenue -- at the Minuteman Commuter Bikeway, at Brooks Avenue (by the Hardy School), and at Massachusetts Avenue. Under existing baseline conditions, all of them operate at Level of Service ("LOS") E or F for the critical movement in the morning and evening peak hour.⁹ Thus, for example, in the morning, westbound traffic on Lake Street at the Minuteman Bikeway operates at LOS E, with an average delay of 68 seconds per vehicle. According to VAI, LOS E "describes operations with high control delay values. Individual cycle failures are a frequent occurrence."¹⁰ At Brooks Avenue, again in the morning, westbound traffic on Lake Street operates at LOS F. LOS F "describes operations with high control delay values that often occur with oversaturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels."¹¹ At Massachusetts Avenue, the critical movement in the morning peak is the northbound left turn onto Lake Street

⁷ TAC report dated 9/26/16.

⁸ VAI TIA dated November 2020.

⁹ VAI Response to Peer Review Comments (January 15, 2021) Table 12R. Level of Service (LOS) for Signalized and Unsignalized intersections is described in the TIA dated November 2020 at pages 22-24. Level of Service ranges along a spectrum from A (the best) to F (the worst). Defined simply, LOS D refers to a situation where operating conditions are approaching unstable flow; LOS E, to unstable flow; and LOS F, to forced or breakdown flow. See AASHTO, A Policy on Geometric Design of Highways and Streets, 7th ed. 2018, Table 2-2.

¹⁰ VAI TIA dated November 2020 at p. 24.

¹¹ Id.

headed west, in the direction of Route 2. That movement also operates at LOS F.

60. The situation at unsignalized intersections on Lake Street is also unsatisfactory. For unsignalized intersections, Level of Service measures delay on the “minor,” side street.¹² From west to east, in the baseline situation, Wilson Street operates at LOS F in the morning and LOS E in the evening. Littlejohn Street is the same. Homestead Street operates at LOS F in the morning but LOS D in the evening. At Burch Street / Alfred Road, both Burch Street (northbound) and Alfred Road (southbound) operate at LOS E, morning and night. At Margaret Street / Lakehill Avenue, Margaret Street (northbound) is LOS F both morning and evening, while Lakehill Avenue (southbound) operates at LOS D in the morning and LOS F in the evening. All this translates to frustrating queues as cars from the side streets try to make their way onto Lake Street during peak hours. VAI reports calculated queuing lengths of one to four vehicles. Residents testify to much longer queues, and have submitted to the Board photographs showing long lines to get from the side streets onto Lake Street. According to testimony and written statements from residents, entering Lake Street from the neighborhood side streets is especially difficult in the evening rush due to bumper-to-bumper eastbound traffic and the lack of adequate sight lines.
61. While it is possible to argue over details, there’s no serious debate about the big picture. Service on Lake Street is degraded in the peak direction during both morning and evening peak periods, and the side streets experience significant queuing delays as residents try to get out of their neighborhoods and onto the only major street they can access. This situation is generally experienced by everyone concerned as exasperating and unacceptable. The Board finds that Lake Street will be failing or near failing in 2027 whether the Approved Project is built or not.
62. It would be possible to stop here and say that adding any more traffic to a failing situation is wrong, however small the increment might be. The Board is not, however, feel free to take that position in a 40B case, where it must, as a matter of law, give heavy weight to the regional need for affordable housing.
63. Thus, the principal issue before the Board is how much worse than baseline the situation will be when the Approved Project is built. There are two separate questions here. The first involves the impact of the Approved Project on the functioning of Lake Street itself. This question may be addressed by looking at the wait-times and queuing at the signalized intersections on Lake Street. The second question has to do with access to Lake Street from the neighborhood streets. Here it is necessary to look at the delays and queuing at unsignalized

¹² VAI Transportation Impact Assessment dated November 2020 at p. 23.

intersections, which measure the frustration of motorists attempting to get onto Lake Street during rush hour.

Incremental Impact of the Approved Project

64. At the outset, the Board notes that, according to VAI's calculations, the weekday peak hour trips generated by the project as a whole (including both the duplexes and the senior residential building) is estimated to be 23 in the morning and 28 in the afternoon. These estimates include both entering and exiting traffic. As noted above, Lake Street carries 1,662 vehicles in the morning and 1,351 in the afternoon peak hours, respectively. It would be surprising if an increase in trips in the range of 2% had a large impact on the Lake Street's operations.
65. VAI's Signalized Intersection Capacity Analysis Summary confirms that the Approved Project will have a small effect.¹³ The only decline in level of service at any of the Lake Street signalized intersections is at Lake Street eastbound at Brooks Avenue, which declines from LOS D to LOS E. The incremental delay associated with this decline is three seconds, from 53 to 56. The median queue increases from 246 to 249 feet, while the 95th percentile queue increases from 442 feet to 448 feet. This incremental impact is similar to the impact observed for other movements at the Lake Street signalized intersections, even though they do not affect the level of service category. In essence, Lake Street is so severely impaired that the additional traffic generated by the Approved Project has little additional impact.
66. The situation is somewhat different at unsignalized intersections. There, the critical issue is access to Lake Street, which, it bears repeating, is the only way out of the neighborhood. VAI's analysis, shown in part in Table 1, below, indicates that the Approved Project would not cause the "level of service" (LOS) of an unsignalized intersection to change. This is not reassuring, however, in the case of LOS F, because there is no level worse than that. Wherever there is an LOS F situation, the amount of delay shown is >50 seconds.¹⁴ LOS F conditions can deteriorate a lot despite nominal delays remaining the same at >50 seconds. It is helpful therefore to look at queueing estimates, which provide a rough indication of how much deterioration there may be within the LOS F category.
 - a. The queueing data show that the intersection of Littlejohn Street and Lake Street would be most heavily impacted by the Approved Project. In the

¹³ VIA, Revised Traffic Impact Assessment (2021) at pp. 11-12, Table 7.

¹⁴ At unsignalized intersections, a delay greater than 50 seconds is sufficient for LOS F; at a signalized intersection, the cut-off point is 80 seconds.

morning peak hour, the queue at that intersection increases from 60 feet to 95 feet, or a little less than two additional car lengths. In the evening, it increases from 18 feet to 30 feet. Since this intersection operates at LOS E in the evening, the data on delay are meaningful. The increase in queueing goes along with an 8 second increase in delay (from 39 seconds to 47 seconds).

- b. The other unsignalized intersection where the Approved Project would have a noticeable impact is at Margaret / Lakehill Avenue. There, the increase in queueing on Margaret Street in the morning peak is from 83 to 95 feet, while the increase in the evening peak is from 113 feet to 123 feet. This increase is less than the similar increase on Littlejohn Street – a bit under a car length – but it occurs at a somewhat more congested intersection.
67. The foregoing discussion assumes that VAI's trip generation estimates for the Approved Project are reasonable. Despite considerable uncertainty, the Board finds that they are.
- a. There are two main sources of uncertainty. First, it is generally accepted practice to rely on data published by the Institute of Traffic Engineers (ITE) to estimate the trip generation associated with different land uses. However, there is no category in the ITE Manual that corresponds to the use of the proposed senior residential building – “independent living with services.” To be conservative, VAI used ITE's land use category (LUC) 252 (“senior adult housing – attached”) for its trip generation estimate. This is a category for seniors 55 years old and up and may include many people still in the workforce. The Approved Project would include housing for seniors 62 years and older and expects to appeal to a cohort in their 70s and 80s. Thus, the population in the senior housing surveyed by ITE was probably younger, healthier, and more likely to be working than the residents in the Approved Project. That population would probably generate more peak hour trips.
 - b. BETA suggested that ITE LUC 253 (congregate care facility) might be nearer the mark.¹⁵ This category would include relatively fewer peak hour trips by residents and relatively more by employees, as some of the public comment on the application suggested. Overall, however, predicted trip generation from congregate care facilities generates fewer peak hour trips than senior adult housing – attached. VAI's choice of the latter category (LUC 252) is therefore conservative.
 - c. The second source of uncertainty is mode split. The ITE surveys that are used

¹⁵ Letter from Tyler de Ruiter (BETA) to Jennifer Raitt, Director of Planning and Community Development re Development Changes – Traffic Considerations Review (September 8, 2021), Comment No. 1.

to calculate trip generation tend to be done in suburban areas where virtually all trips are by car. Where other modes of transportation are significant, as they are here, it is important to adjust the trip generation estimate to take into account trips by transit, bicycling, walking, and more. VAI and BETA agree on the appropriateness in principle of doing this.¹⁶

- d. The difficulty in this case is deciding how mode split should work for a senior residential community. The best guide to predicting mode split is census data on Journey to Work for the census tract in which the Approved Project is located. BETA notes, however, that that this “summarizes the mode split of all working adults to a place of work. This may not be representative of the population of an Independent Living with Services facility, whose residents may not be working and / or may have aged in place such that the respective mode is no longer viable. While the Arlington Council on Aging transport van and jitney service are adequate measures to reduce on-site parking, these services would still generate personal / shared vehicle trips to / from the Site at an on-demand rate that otherwise do not travel through the neighborhood under existing conditions.”¹⁷
- e. BETA’s observation poses a quandary. Assuming an all-automobile peak-hour mode split in this transit-friendly location is clearly unrealistic. At the same time, the Census Bureau’s Journey to Work data likely overestimate the percentage of transit and other non-automobile trips (and underestimates the proportion of automobile trips) in this particular location. VAI addresses this dilemma by reducing in half its estimate of non-automobile trip generation based on the Journey to Work data. The Town’s Department of Planning and Community Development endorsed this solution in its August 23, 2021, memorandum to the Zoning Board of Appeals. (p.2).
- f. The Board agrees with the DPCD that VAI’s proposed mode split is a reasonable if imperfect approach. In any event, the mode split assumption has only a modest impact on estimated trip generation and would not significantly change the overall capacity analysis discussed above.

TABLE 1: UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY								
Unsignalized Intersection/Critical Movement, Peak Hour	2027 No-Build Scenario				2027 Build Approved Project			
	V/C	Delay	LOS	Queue (feet)	V/C	Delay	LOS	Queue (feet)

¹⁶ Ibid., Comment 2.

¹⁷ Letter from Tyler De Ruiter, BETA, to Jennifer Raitt, Director of Planning and Community Development, Town of Arlington, August 10, 2021, at 2.

<i>Lake Street at Wilson Avenue</i>								
Weekday Morning: Wilson Avenue NB LT/RT	0.13	>50	F	10	0.14	>50	F	13
Weekday Evening: Wilson Ave. NB LT/RT	0.15	40	E	13	0.15	42	E	13
<i>Lake Street at Littlejohn Street</i>								
Weekday Morning: Littlejohn Street NB LT/RT	0.56	>50	F	60	0.81	>50	F	95
Weekday Evening: Littlejohn Street NB LT/RT	0.20	39	E	18	0.31	47	E	30
<i>Lake Street at Homestead Road</i>								
Weekday Morning: Homestead Road NB LT/RT	0.16	>50	F	13	0.16	>50	F	13
Weekday Evening: Homestead Road NB LT/RT	0.09	31	D	8	0.09	31	D	8
<i>Lake Street at Burch Street/Alfred Road</i>								
Weekday Morning: Burch St. NB LT/TH/RT	0.27	>50	F	25	0.27	>50	F	25
Weekday Morning: Alfred Rd. SB LT/TH/RT	0.15	44	E	13	0.15	45	E	13
Weekday Evening: Burch St. NB LT/TH/RT	0.28	>50	F	25	0.28	50	F	25
Weekday Evening: Alfred Rd. SB LT/TH/RT	0.06	48	E	5	0.06	48	E	5
<i>Lake Street at Margaret Street/Lakehill Avenue</i>								
Weekday Morning: Margaret Street NB LT/TH/RT	0.80	>50	F	83	0.87	>50	F	95
Weekday Morning: Lakehill Avenue SB LT/TH/RT	0.20	40	E	18	0.20	41	E	18
Weekday Evening: Margaret Street NB LT/TH/RT	0.90	>50	F	113	0.96	>50	F	123
Weekday Evening: Lakehill Avenue SB LT/TH/RT	0.40	>50	F	38	0.46	>50	F	43
Source: VAI Letter to Arlington Board of Appeals August 3, 2021, Table 6.								

Effect on Quality of Life

68. Beyond the effects of the project on highway performance lies a broader question of the effect of increased traffic on neighborhood streets on the quality of life in the community. The Executive Committee of the Arlington Traffic Advisory

Committee put the issue well in its January 6, 2021, memorandum to the Board:

The Executive Committee believes the traffic impacts on Littlejohn Street, Dorothy Street and Burch Street may result in a significant percentage increase in neighborhood traffic volumes. This is a quality of life issue rather than a roadway capacity issue. The Executive Committee recommends a post-development monitoring study be included in the TDM program. The study may identify traffic calming measures which are needed to mitigate impacts on the neighborhood streets.

Although the Executive Committee's comments were addressed to an earlier proposal, they are equally applicable to the Approved Plan. Indeed, the issue of neighborhood impact was frequently raised by neighborhood residents in connection with the final proposal as the public hearing drew to a close. The quality-of-life dimension of traffic is a local concern of no less importance than the highway capacity analysis discussed above.

69. In addition to peak hour trips, the ITE surveys collect data on weekday daily trip generation. Here, VAI has calculated that the project (including both the duplexes and the senior residence building) would generate 412 additional trips each weekday. Daily trip generation would be modestly less on the weekends. The question before the Board is what impact daily trips of this magnitude would have on the neighborhood.
70. Testimony before the Board indicates a general sense that the neighborhood is relatively quiet and secluded. The Board received testimony from some witnesses that on the weekends children play pickleball in the street, with little interference from traffic. Other witnesses, however, lamented that the neighborhood was already under pressure from increased traffic generated by Thorndike Field and other sources. Regardless of their assessment of the current situation, neighbors expressed trepidation at the impact on their neighborhood of the increased level of traffic that they feared the project would generate. The Board credits the unanimous testimony of neighbors that substantially increased traffic on a daily, as opposed to peak hour basis, would have a significant impact on the nature of the community. As the Executive Committee points out, this is a quality of life rather than a network capacity issue. In this regard, it is closely akin to the issues discussed below regarding compatibility with the project's surrounding neighborhood.
71. In an effort to give a context to the estimated increase in trip generation attributable to the project, Tyler De Ruiter, BETA's traffic engineer, compared the daily trip generation attributable to the project to the trip generation that would

be expected from the present neighborhood. Mr. De Ruiter assumed that the neighborhood was evenly composed of single family and two family dwellings and excluded dwellings directly fronting on Lake Street. Using ITE trip generation factors, he calculated that the daily traffic generated by the current neighborhood was 2,276 trips. The additional traffic expected from the project would be 412 trips, or approximately 18% more. Mr. De Ruiter did this calculation as a rough indication of the scale of the likely impact. He did not invite the Board to put too much weight on it, because its accuracy may be affected by simplifying assumptions and because traffic in the neighborhood may be generated by centers other than residences in the neighborhood, such as Thorndike Field. The calculation does, however, present an approximate picture of the increased traffic within the neighborhood.

72. There is room for disagreement on how substantial an increase in daily traffic on the order of 18% is. An abutter argued that Mr. De Ruiter's calculation showed a tremendous increase in traffic that would certainly impair the quality of life in the neighborhood. The Board is sure that some and perhaps many residents in the neighborhood would consider the impact significant, as the TAC Executive Committee anticipated. The Executive Committee's recommendation of post-construction monitoring and consideration of traffic calming measures has much merit, both for the comfort of the community and the safety of the residents of the senior housing facility.

Proposals to Address Traffic Impact

73. The Applicant proposes to address traffic impacts in several ways.
 - a. In addition to the jitney service, the Applicant proposes a number of other measures to reduce automotive traffic and congestion on the road network. These include scheduling deliveries and trash pick-up outside of peak traffic hours; scheduling staffing schedules outside of peak traffic hours; charging separately for parking in order to discourage car ownership, providing bicycle parking, including interior and exterior racks; and reaching out to Zipcar for possible car-share options. The Applicant also proposes to provide a transit information packet to residents and staff at the senior residential building.
 - b. Many of the Applicant's proposed solutions to the traffic problem involve moving trips around so that they do not occur during peak traffic times. This is fundamentally important for addressing traffic capacity issues. Other solutions, like the jitney service, are convenient to residents (and reduce parking demand) and support employee commuting by mass transit. However, to the extent that this service merely replaces a trip by personal automobile with a trip by jitney, trip generation is not necessarily reduced.

74. As recommended by the Arlington Transportation Advisory Committee in its report dated January 6, 2021, the Board finds that due to the traffic impacts on the neighborhood streets between Lake Street and the project location, particularly Littlejohn Street, Dorothy Road, and Burch Street, a post-development monitoring study is necessary to identify whether future traffic calming measures are needed to mitigate impacts on the neighborhood streets and what measures would be desirable.

Neighborhood Compatibility

75. The existing neighborhood adjacent to the Project site bounded by Lake Street, Route 2, and the Minuteman Bikeway encompasses approximately 39.3 acres of developed land (excluding the Property). The land west of Littlejohn Street is zoned for single-family residences, and the land to the east is zoned for two-family residences. The Town's abutter list indicates 289 dwelling units in this neighborhood.
76. The final proposed Project envisions 12 dwelling units in 6 duplex structures and a large rental building to be used for senior housing. The senior housing will provide senior independent living with services and will be available to people 62 years of age or more. The Applicant anticipates that the residents of the senior housing will consist primarily of people in their 70s and 80s. While the proposed senior housing will address the Town's concern to provide more housing for seniors, it is unlikely that this population would use the Alewife MBTA station heavily for commuting. Even though proximity to the MBTA would continue to be an attractive feature for some residents of the senior housing and many residents of the duplexes, the final proposed Project has largely abandoned the theme of transit-oriented development as an organizing principle.
77. The six (6) duplex structures along Dorothy Road are generally compatible with the size and scale of adjacent residences along Dorothy Road, Littlejohn Street, and throughout the neighborhood.
78. While the four-story senior residential building is smaller than the apartment building previously proposed, it continues to be massive in comparison to the size and scale of residences in the surrounding neighborhood. (The senior living building would be among the largest apartment developments in Arlington, and one of the few, if not the only one not connected to a collector or arterial street without the need to access a local residential street network.) The duplex structures along Dorothy Road will address this concern in part by providing a street-level visual buffer from the senior residential building. The senior residential building also features a number of design elements that reduce its visual impact. Nevertheless, the neighborhood continues to be concerned that the final proposed Project is too

big and is incompatible with the established character of the neighborhood.

79. The Property is located within the Planned Unit Development (PUD) Zoning District. In this District, duplexes are allowed as of right and a multifamily housing building is conditionally allowed. The height of the proposed buildings would be within the limits allowed in the PUD district. The duplexes, at 3 stories and 38.13 feet from the first floor elevation to the ridge, are a little taller than the buildings on neighboring properties (especially those on the other side of Dorothy Road), which are subject to height limits of 2.5 stories and 35 feet. The duplexes were reintroduced to the project plan at the request of the Select Board. The duplexes serve as a buffer between the lower density residential neighborhood and the higher density senior residential building. Their height, by better concealing the senior residences, actually makes the duplexes more effective in their buffering function.
80. The neighborhood's concerns include not only the size of the proposed structures but the activities that will be associated with those structures. In Finding 71, Tyler De Ruiter, BETA's traffic engineer, calculated that the daily traffic generated by the current neighborhood was 2,276 trips, and the additional traffic expected from the project would be 412 trips, or approximately 18% more. The home owner at the corner of Dorothy and Littlejohn noted his front door camera recorded around 50 vehicle trips past his house on an average day. The additional anticipated trips would increase that number eight-fold. The Board has received testimony that the neighborhood today is very quiet and that children can safely play in the streets. (A pickleball court was created on Littlejohn Street adjacent to Dorothy Road.) Some residents fear that the greatly increased activity associated with the final proposed Project will adversely affect safety and the established quality of life in the neighborhood.
81. The Applicant originally proposed 315 parking spaces for the Project, a ratio of 1.44 parking spaces per unit. The Applicant subsequently reduced the parking ratio to 193 spaces, or approximately 1.12 spaces per unit. The Applicant's final project design provides 95 parking spaces for the senior living building: 84 garage parking spaces and 11 surface parking spaces. The parking garage will include 10 Electric Vehicle (EV) charging stations, with an additional 10 EV ready parking spaces, as shown on the Project Plans. The parking garage will provide for eight (8) handicap parking spaces as well as two (2) surface parking spaces designated for handicap parking, as shown on the Approved Plans. The Project's duplex units will have tandem parking to accommodate two vehicles per unit, with the exception of the eastern end unit, which will have a single parking space.
82. The Applicant did not originally propose bicycle parking. The Applicant's final proposed project design includes 28 covered, secured bicycle parking spaces accessible from the front of the senior living building. There is a possible

expansion area for eight (8) additional bicycle parking spaces within the senior residential parking garage. Outside the main entrance of the senior living building, the Applicant will provide an additional two (2) bike racks, capable of securing six (6) bikes apiece.

Construction Impacts

83. The Applicant has proposed to use modular construction for the senior residential building, which entails assembling the building with a number of "modular units" or "boxes". Modular units are pre-fabricated elements of building structure that are 62 feet long, 13 feet wide, and 11 feet high, and will be delivered to the Project site via flat-bed trailers. The Applicants believe this construction technique could shorten the project schedule by up to five months, and reduce the amount of waste generated on site.
84. However, this technique requires trucking large sections of building structure down Littlejohn Street, a residential road that is 24-25' wide, curb to curb. The Applicant provided turning plans for delivery vehicles and stated that deliveries will be coordinated with the Arlington Police Department, Arlington Fire Department, and Department of Public Works (as necessary). Abutters remained concerned about the delivery driver's ability to navigate roadways along the delivery route, traffic obstruction, and impediments to emergency vehicle access.
85. Construction staging, specifically for the modular units, but applicable to all other aspects of construction, pose a high risk of disturbance to the residential neighborhood. The 25-foot width of the local streets make navigation of the neighborhood challenging, especially in the presence of parked cars and pedestrians. The Applicant has repeatedly informed the Board that staging would take place offsite at several miles distance from the Project. The Applicant has also advised the Board that offloading would take place on the subject Property. The Board finds that these measures are important in reducing the construction impact on the neighborhood.
86. Construction of the Project is expected to take 12-18 months, which will certainly be a disruptive time for local residents. Construction disruptions were frequently raised as areas of concern, including (but not limited to): noise, dust, construction vehicle parking, vibration, damage to street trees, damage to foundation of nearby homes, and rodent control. The Board recognizes these as significant quality of life concerns for local residents, and has endeavored to address them through the imposition of appropriate conditions.
87. In addition to the delivery of modular units, the board anticipates that construction of the project will entail a variety of other heavy vehicles and construction

machinery being brought to the site. Residents expressed concern about the potential for severe wear and tear and damage to local roadways, as a result of heavy vehicle traffic.

88. The Project site being surrounded by single- and two-family residences poses challenges not usually encountered by large construction projects in Arlington. Other recent residential developments were either in predominantly commercial or industrial districts, or they were accessed by arterial streets. This site has no such advantages; all construction deliveries and activities must travel down local roads in a residential district. The neighbors expressed significant concern about construction noise impacting their quality of life.
89. The Town's Noise Abatement Bylaw (Title V, Article 12) allows construction activities between 8:00am and 6:00pm on weekdays and 9:00am and 5:00pm on Saturdays, Sundays, and holidays. The local residents expressed considerable concern regarding what could be relentless construction without any quiet days. There was considerable interest in eliminating weekend work, even at the expense of a longer work schedule. The Applicant was interested in starting weekday work earlier than allowed by the bylaw. This would provide the opportunity to have the workers arrive on site early, before traffic would make commuting difficult. They were amenable to no Sunday or holiday hours if they could start weekdays earlier. The Board found this compromise acceptable and has incorporated these hours into the Conditions.
90. In the course of the public comment period, many abutters and local residents expressed their significant concerns in regards to the effects the construction activities would have on their neighborhood. These concerns included blockage of streets by construction vehicles, traffic made worse by construction vehicles, contractor parking, storage of construction materials, and the unloading of construction materials. Additional concerns included what specific routes the contractors and construction delivery vehicles would take to the site, and at what time those deliveries would occur so as to minimize impacts on local traffic. There were also concerns raised in regards to noise, dust, and vibration emanating from the site during construction, construction causing damage to their homes, damage to street trees, damage to local roadways, damage to the wetlands, and damage to local wildlife. Other construction related issues that were raised involved pest control, light emanating from the site during construction, what dates construction would begin and end, along with what would be the days of the week and times work on the site would be allowed. Several parties were anxious about the safety of the neighborhood children during construction, especially on the weekends. The abutters and local residents made it known they need to be informed and receive satisfactory responses to these questions and concerns. Furthermore they expressed the need to know whom to contact if they require further information involving the

construction or whom to contact if they observe issues and wish to notify someone or make a complaint.

Open Space and Management of Conservation Parcel

91. While remaining undeveloped, it is important to note the Property as it currently exists is in quite poor condition. After prior unsuccessful attempts over the past decades to develop the land, it has been neglected for many years. In that time, construction and other debris has been deposited in many areas of the site. Invasive vegetative species have taken root. Historic wetlands have been filled and further obscured by overgrowth.
92. More recently, an encampment of homeless people had been established on the Property, which had resulted in sanitation and other issues. The Town and the Owner have taken action to re-house / relocate this population within the recent past, but left unmanaged, the possibility of return encampments is likely. The Board finds that any debris or waste left on the site by prior dumping and / or encampment needs to be identified and remediated.
93. The portion of the Property to be developed as housing units is limited to a 5.6 acre portion of the site, closest to Dorothy Road, and on the predominantly upland portion of the Property. The balance of the Property, approximately 12 acres, is proposed to be restricted against future development and retained as open space. This proposed open space area has potential for passive recreation, environmental education, and a connection to the Minuteman Trail.
94. The Board has received evidence of the policies and efforts of local and state government to preserve the Property for Open Space purposes. A 1992 Metropolitan District Commission (MDC) study ranked the Property the 3rd highest priority for conservation of 205 key open space parcels not yet protected in the metropolitan area. In 2000, the MDC "reiterate[d] its belief that the Mugar parcel is among the most significant, privately owned Open Space parcels remaining in the metropolitan region". In 2015, its successor agency, the DCR "acknowledge[d] that permanent protection of the site would complement other protected open spaces in and around Alewife Brook". The parcel abuts other protected Open Spaces including the Minuteman Bikeway and Thorndike Field.
95. The Town of Arlington has consistently identified the parcel as a top priority for Open Space. Town Meeting in 2000 and again in 2001 voted to direct the Select Board to negotiate with the Owner to acquire the site. The Trust for Public Land was engaged to assist with the negotiations, which were unsuccessful.
96. The Board has received evidence of the Town's policy that the parcel is needed for

Open Space, which has been consistently articulated in its planning documents. The Town's Master Plan names the parcel "a high priority for preservation". Arlington's Open Space and Recreation Plan (2015-2022), adopted as a Town policy document by the Arlington Redevelopment Board acting as the Town's planning board, states that "The 17-acre Mugar property in East Arlington remains the highest priority goal for acquisition and protection as open space and floodwater storage."

97. The Town's policy to preserve the entire Property as open space is inconsistent with the development of any portion of the Property. However, if development of a part of the Property is to take place, as the Approved Plan envisages, it is extremely important to ensure the restoration and remediation of the remaining land and to prevent its future use or development in ways that are inconsistent with its function as passive open space.
98. The Property provides significant wildlife habitat. On a number of occasions members of the public have articulated their view of the critical importance of not only maintaining habitat, but of enhancing and creating additional habitat, particularly in the Open Space parcel. They described the diversity of wildlife that they have observed and provided photographs, including, of waterfowl and deer. In its August 5, 2020 letter to the Department of Planning and Community Development (DPCD), BETA stated that wildlife habitat is of significant interest to the Town. They indicated that the Property would be expected to support numerous urban species such as common resident birds, raccoons, fox, squirrels, chipmunks, skunk, opossum, deer and rabbits. They recommended that the Applicant conduct a wildlife habitat evaluation. Applicant's consultant, BSC Group, performed an evaluation on October 27, 2020. BSC observed several species including rabbit, squirrel, (presumed) coyote and a variety of passerine birds. BSC's report entitled *Wildlife Habitat and Vegetation Evaluation*, dated November, 2020, confirmed BETA's assessment that the Property would be expected to serve as habitat for other human-adapted or human-tolerant species. BSC also noted that the habitat, especially in the Open Space parcel, had been degraded by dumping of waste, including concrete and macadam and the accumulation of trash and debris, as well as from the encampment of homeless people. The inference may be drawn that the clean-up of the area and the cessation of human habitation will significantly improve the wildlife habitat.
99. In alignment with prior attestations, the Applicant has proposed that the portion of the Property outside of the development area, shown on the plans as containing approximately 12 acres (the "Conservation Parcel") be placed under a conservation restriction and may be deeded to entity third party to hold the Conservation Parcel as open space. The Town has expressed significant concern regarding the existing condition of the proposed Conservation Parcel, which will require extensive environmental testing and clean-up relating to years of illegal dumping and

habitation. Through the terms of a proposed Memorandum of Understanding (MOU) with the Town of Arlington, the Applicant intends to establish a proposed funding schedule to advance certain conservation and / or restoration efforts for the Conservation Parcel. The Applicant has made the following attestations:

- a. The Applicant has offered to record a perpetual restriction against future development on the Conservation Parcel. The area to be conserved is to be consistent with the BSC plan entitled "Proposed Conservation Parcel," as revised through August 27, 2021.
- b. The Applicant has contracted for third party services to engage in removal of solid waste and needles / sharps previously disposed on the property. Under this commitment, the first step necessarily involves the removal of needles / sharps from the ground. The work on the removal of the sharps began in September 2021, and will continue to advance to the removal of solid waste / former encampment sites. The Applicant has committed \$100,000 towards this initial effort.
- c. Working together with the Somerville Homeless Coalition and the Arlington Police Department, the Applicant has been responding to the community issue of finding housing for unhoused persons on the property.
- d. The Applicant recognizes that additional funds will be required to perform environmental testing, remove additional solid waste / debris, and to prepare and implement a prioritized mitigation plan to reduce the invasive species population and provide for replanting / rehabilitation within the Conservation Parcel. While the Town and the Applicant negotiate final terms for an MOU regarding the disposition of the Conservation Parcel, the Applicant has agreed to set aside an additional \$100,000 toward planning and removal of solid waste / invasive species within the Conservation Parcel.
- e. The Applicant has offered to fund, over the course of a ten-year period, an annual contribution of \$25,000 for continued implementation / maintenance of the Conservation Parcel. To provide assurance to the ZBA, the Applicant has offered to accept a condition to include a \$25,000 annual maintenance budget for ten years upon issuance of the final certificate of occupancy.
- f. These findings do not limit the Applicant's obligation to clean / restore / remediate the site, nor does it remove any other requirements on the Applicant under State or Federal Law.

As a part of the initial submission, the Applicant had proposed donating the land of the Conservation Parcel to the Town. Over the course of the hearings, the Applicant has proposed passing the property onto a third party non-profit or holding

the property. This has not been uniformly viewed by the Town or the public as being in alignment with the initial proposal for the property. While the ownership of the land may be different, the Board notes that a firm Conservation Restriction on the Conservation Parcel is of utmost importance in the preservation of the land, its wetland resources, its wildlife, and its function as a buffer against future flooding and climate change impacts.

General

100. The Board finds that the conditions imposed in Section IV of this Decision are necessary in order to address Local Concerns. At no time during the public hearings did the Applicant contend that the cost of the project rendered it uneconomic. As such, the Board finds that such conditions will not render the project uneconomic. To the extent that such conditions may render the project uneconomic (as defined in 760 CMR 56.02), the Board finds that the Local Concerns outweigh the potential benefits of the proposed affordable units.
101. The Board finds that granting certain waivers from local by-laws and regulations is acceptable even though granting waivers may have an adverse impact on Local Concerns.
102. The Board acknowledges concerns raised by abutters and other interested parties about the Project's potential incompatibility with abutting residential uses, particularly relating to stormwater and floodplain impacts, as well as traffic and parking impacts. The Board has addressed these concerns by the imposition of appropriate conditions. The Board further finds that conditions detailed below appropriately address these matters of local concern in a manner that outweighs the regional need for affordable housing. The Board finds that the conditions imposed below address local and regional housing needs while properly protecting valid issues of local concern.
103. The Board finds that the construction of the Project, as conditioned, will be consistent with local needs.

IV. CONDITIONS

A. **General**

- A.1 The holder of this Comprehensive Permit is Arlington Land Realty, LLC. The Property is defined as the property located between Concord Turnpike (Route 2) to the south and residential neighborhoods to the north and east of the Property, off Dorothy Road and Parker Street, shown on a plan entitled "Thorndike Place Comprehensive Permit, Dorothy Road, Arlington, Massachusetts" prepared by

BSC Group, dated March 13, 2020, with revisions through August 27, 2021. The Project is defined as all features shown on the plans listed below in Condition A.2 or as otherwise required by this Comprehensive Permit.

- A.2 Except as may be provided for in the following Conditions or in the Final Plans referenced below, the Project shall be constructed substantially in conformance with the plans and drawings listed below in this Condition A.2, which for purposes of this Comprehensive Permit shall be considered the Approved Plans for the Project ("Approved Plans"). Minor changes to the Approved Plans (e.g., changes that do not materially affect the location of, or increase the height or massing of the structures, or increase the number of units contained in the residential buildings) shall be submitted to the Director of Planning and Community Development who shall have the authority to approve such changes as immaterial changes. It is understood that the areas on the interior of the senior residential building designated for Common Area spaces have not been fully designed for the intended uses, e.g., dining rooms, kitchen, reading nooks/library/meeting rooms/etc., and that the layout and designation of those spaces shall be depicted on the Final Plans (the provision of such additional detail shall not constitute a change in the Approved Plans so long as the number of units, unit sizes and the number of bedrooms is not changed). If the Director of Planning and Community Development determines that any proposed changes do not conform to the requirements of this Comprehensive Permit, they shall so notify the Applicant and the Applicant shall either bring the plans into conformance with this Decision or seek modification in accordance with 760 CMR 56.05(11). The Approved Plans consist of the following plan set from the BSC Group, Inc.:

"Thorndike Place Comprehensive Permit, Dorothy Road, Arlington, Massachusetts" dated March 13, 2020, with revisions through August 27, 2021, and consisting of the following sheets:

G-100	Title Sheet
G-101	General Notes & Legend
V-100	Existing Conditions Plan
C-100	Existing Environmental Resources Plan
C-101	Site Preparation Plan
C-102	Overall Site Plan
C-103	Layout and Materials Plan
C-104	Grading and Drainage Plan
C-105	Utility Plan
L-100	Planting Plan
C-200-203	Civil & Landscape Details
--	Potential Conservation Parcel, dated 8/27/21

Architectural details contained in the plans entitled Thorndike Place, Arlington Massachusetts, dated September 2, 2021, prepared by Bruce Ronayne Hamilton Architects/GreenStaxx, and consisting of the following sheets:

Sheet 1	Garage Plan
Sheet 2	Ground Floor Plan
Sheet 3	Second Floor Plan
Sheet 4	Third Floor Plan
Sheet 5	Fourth Floor Plan
Sheet 6	Duplex "A" Floor Plans
Sheet 7	Duplex "B" Floor Plans
Sheet 8	Duplex "A" Elevations
Sheet 9	Duplex "B" Elevations
Sheet 10	North Elevation – Dorothy Road
Sheet 11	West Elevation
Sheet 12	North Elevation – 4-Story Building
Sheet 13	East Elevation
Sheet 14	South Elevation
Sheet 15	Site Section at West End-Dorothy Road
Sheet 16	Site Section at East End – Dorothy Road

- A.3 The Applicant shall be a Limited Dividend Entity as required by Chapter 40B and its successors and assigns shall comply with the limited dividend and other applicable requirements of Chapter 40B and the regulations adopted thereunder.
- A.4 The Project shall consist of not more than twelve (12) ownership units, contained within six (6) duplex buildings together with a 124-unit senior living residential apartment units located within a single residential building, and other related residential amenities, all as shown on the Approved Plans. The Project shall consist of no more than twelve (12) four-bedroom ownership units in the duplex buildings and 58 studio rental units, 23 one-bedroom rental units, and 43 two-bedroom rental units in the senior living apartment building, with the total number of bedrooms associated with the senior living building to be 167 bedrooms.
- A.5 There shall be ninety-five (95) vehicle parking spaces (inclusive of required handicap spaces) for the senior living apartment building. The duplex units will have driveway parking for 2 vehicles per dwelling unit, with the exception of the end units, with one parking space to the side/rear of the duplex unit.

- A.6 Pursuant to the revised Waiver List submitted to the Board and attached hereto, the Applicant has requested, and the Board has granted, those waivers from the Arlington Zoning Bylaw and other local by-laws and regulations as specified therein. No waivers are granted from requirements that are beyond the purview of G.L. c. 40B, §§ 20-23. No waiver of permit or inspection fees has been granted. Any subsequent revision to the Approved Plans, including but not limited to revisions in the Final Plans, referenced below, that requires additional or more expansive waivers of any local by-laws or regulations, must be approved by the Board in accordance with 760 CMR 56.05(11).
- A.7 Except as otherwise specifically provided herein, where this Decision provides for the submission of plans or other documents for approval by the Director of Planning and Community Development or other Town Departments, the Director of Planning and Community Development or applicable Department Head will review and/or provide a written response within forty-five (45) days following submission. For submissions that require assistance from an outside consultant, as determined by the Director of Planning and Community Development or applicable Department Head, the forty-five day time period shall not begin until the consultant's fee has been fully funded by the Applicant. Should forty-five (45) days elapse without a response as aforesaid, said plans or documents shall be deemed approved.
- A.8 This Comprehensive Permit may be subsequently assigned or transferred pursuant to 760 CMR 56.05(12)(b). The pledging of the Property as security under any conventional loan financing terms as set forth in the financing entity's Loan Documents or any foreclosure sale pursuant to the same shall not constitute an assignment or transfer under this paragraph.
- A.9 The provisions of this Comprehensive Permit Decision and Conditions shall be binding upon the successors and assigns of the Applicant, and the obligations shall run with the land. In the event that the Applicant sells, transfers, or assigns its interest in the development, this Comprehensive Permit shall be binding upon the purchaser, transferee, or assignee and any successor purchasers, transferees or assignees. The applicable limited dividend restrictions shall apply to the owner of the project regardless of sale, transfer, or assignment of the project, provided that the Regulatory Agreement with the Subsidizing Agency has not otherwise expired.

- A.10 The sidewalks, driveways, roads, utilities, drainage systems, and all other on-site infrastructure shown on the Approved Plans (excepting the existing storm drain and sewer lines) as serving the Project shall remain private in perpetuity, and the Town shall not have, now or in the future, any legal responsibility for the operation or maintenance of the infrastructure, including but not limited to snow removal, landscape maintenance, and hydrant maintenance. The proposed access drive within the Project shall not be dedicated to or accepted by the Town.
- A.11 Unless otherwise indicated herein, the Board may designate an agent to review and approve matters on the Board's behalf subsequent to this Decision.

B. Affordability

- B.1 Except as may otherwise be allowed by the Subsidizing Agency MassHousing or other Subsidizing Agency, pursuant to the applicable subsidy program, a minimum of twenty-five percent (25%) or three (3) of the ownership duplex condominium units and thirty-one (31) units of the rental apartments shall be reserved for income-eligible households, meaning that they shall be sold and/or rented, as applicable to and occupied by households, as proposed by the Applicant, whose income (adjusted for household size) is not more than eighty percent (80%) of the Area Median Income ("AMI"), as determined by the United States Department of Housing and Urban Development ("HUD") and the Subsidizing Agency (the "Affordable Units"). This condition is not intended to create or impose conditions with respect to such affordable units, which is the purview of the Subsidizing Agency, but rather to reiterate the requirements of Chapter 40B. As determined by the Subsidizing Agency, the Affordable Units (rental) shall generally be dispersed throughout the Project in accordance with the guidelines of the Subsidizing Agency, except for fluctuations based on changes of household eligibility income allowed by the Regulatory Agreement. It is presumed that the Subsidizing Agency will require the Applicant to be responsible for maintaining records sufficient to comply with its guidelines for the location of Affordable Units in the Project and occupancy of such Affordable Units by income-eligible households. The Applicant shall provide the Board with a copy of such records at the Board's request. As will be set forth more fully in the Regulatory Agreement, the location of the affordable units may change in the event that the income of a household occupying an affordable unit increases beyond allowable program limits. The Board acknowledges that affordable unit location is an issue within the exclusive jurisdiction of the Subsidizing Agency.
- B.2 All of the Project's Affordable Units shall be restricted for sale (as to duplex units) or rental (as to age-restricted senior apartment units) to households earning no more than the maximum allowable household income, adjusted for household size, as determined by MassHousing or any substitute Subsidizing Agency. The

Affordable Units shall be maintained as affordable in perpetuity, which for the purposes of this Decision shall mean for so long as the Property does not comply with applicable zoning and other local requirements without the benefit of this Comprehensive Permit.

- B.3 The Applicant shall obtain approval by the Subsidizing Agency of an Affirmative Fair Housing Marketing Plan ("AFHMP") prior to the marketing and sale of affordable ownership units or rental of affordable apartment units, and shall ensure that the Project complies with the Subsidizing Agency's Fair Housing requirements.
- B.4 For the initial rent-up of the Project, the Board considered imposing a local preference requirement for the affordable units, but after discussion determined that the imposition of such local preference requirement would not be appropriate. Accordingly, the Board has made the affirmative determination that no local preference shall be applicable. A lottery shall be established in a form approved by the Subsidizing Agency and/or the Project's Monitoring Agent.

C. Submission Requirements

- C.1 Prior to any construction or site development activities (including site clearing, tree removal, grading, etc.) on the Property, whether or not pursuant to a building permit (except as allowed by the Director of Planning and Community Development, as noted below), the Applicant shall:
- a. Deliver to the Board a check in a reasonable amount determined by the Director of Planning and Community Development to be used for staff to retain outside experts, if necessary, for technical reviews and inspections required under these conditions but at inception shall not exceed \$6,500 unless an alternate amount has been agreed upon by the Board and the Applicant. Said funds shall be deposited by the Board with the Town Treasurer in an account pursuant to G. L. c. 44, § 53G and shall only be used for technical reviews and inspections associated with this Project. Any unspent funds shall be returned to the Applicant with accrued interest at the completion of the project. If at any time the Board reasonably determines that there are insufficient funds to cover the costs of technical reviews, it shall inform the Applicant and the Applicant shall forthwith deliver additional funds as specified by the Board in a reasonable amount as may be determined by the Board. Said funds may be used by the Board to hire civil engineering, traffic engineering, and/or other professionals that the Board deems reasonably necessary to ensure compliance with the conditions hereof. Such outside review shall be limited only to those circumstances where Town staff is unqualified to undertake such review.

- b. Obtain and file a copy of a National Pollution Discharge Elimination System (NPDES) Permit from the U.S. Environmental Protection Agency (EPA), if necessary. The Board shall also be provided a copy of the Stormwater Pollution Prevention Plan (SWPPP) submitted along with the NPDES filing.
- c. Submit to the Board for review and administrative approval Final Engineering Drawings and Plans ("Final Plans"), such approval to be that the plans conform to the requirements of this Comprehensive Permit and incorporate the relevant conditions herein. The Final Plans shall also incorporate all relevant conditions herein and requirements not otherwise waived by this decision of permitting agencies having jurisdiction. Applicable sheets of the Final Plans shall be signed and sealed by the Professional Land Surveyor of record, the Professional (Civil) Engineer of record, and a Registered Landscape Architect. Final Architectural Plans shall be stamped by a Registered Architect. The Final Plans shall be submitted to the Board at least forty-five (45) days prior to the anticipated date of commencement of building construction or submission of an application for building permits, whichever is earlier (the "Final Site Plan Submission Date").
- d. Submit to the Board for its administrative approval, a Landscaping Plan for areas not under the jurisdiction of Section 24 in the Wetlands Bylaw with the Final Plans in substantial conformance with the Planting Plan included in the Approved Plans, signed and sealed by a Registered Landscape Architect or Civil Engineer, depicting the following:
 - i. Overall planting plan that includes a demarcation of clearing and the limits of work;
 - ii. Planting plans for the access drive showing shade trees and lighting fixture locations, as applicable;
 - iii. Plans of walkways in open space and recreation areas, if any;
 - iv. Prototype planting plans for each building that include shade trees, ornamental trees, shrubs, and groundcovers, as may be applicable;
 - v. Planting schedules listing the quantity, size, height, caliper, species, variety, and form of trees, shrubs, and groundcovers;
 - vi. Tree protection and preservation plans
 - vii. Construction fencing along abutting property lines, if any; and
 - viii. Specifications for site amenities such as benches, trash cans, lighting fixtures.

All plantings shall consist of native, non-cultivar, non-invasive, drought-tolerant species. Plantings installed along drives and walkways shall also be salt-tolerant. The final landscaping plans shall preserve the existing perimeter tree cover to the greatest extent practicable. Annually for a 3-year period after completion of plantings or the issuance of the Certificate of Occupancy, whichever is later, the Applicant shall remove and replace any dead, failing, or diseased plantings and trees serving as screening. The contract with the Management Company shall address ongoing maintenance of landscaping features.

- e. Submit to the Board for its administrative approval, a Landscape Plan for areas under the jurisdiction of Section 24 in the Wetlands Bylaw. As stated in Section 24. A. of the Commission's Wetland Regulations, an adequate quantity of vegetation must be maintained so that resource areas protected by the Bylaw can provide the resource area values protected by the Bylaw. Section 24.B. further states no vegetation in a resource area protected by the Bylaw shall be damaged, extensively pruned, or removed without written approval by the Commission and in-kind replacement. Given the extent of vegetation proposed to be removed within a resource area (here, BLSF and AURA), the Applicant's plan should include the elements described in Section 24.E. and as follows:
 - i. Narrative describing existing conditions, proposed plantings, list of existing and proposed species, size of existing species and proposed species, quantity of plants before and after revegetation, and the rationale behind the removal and maintenance plan.
 - ii. Affirmation of the proposed Revegetation Activities - all plans must be accompanied by written testimony and scale diagram from a certified arborist or wetland scientist or landscape architect saying vegetation removal is necessary, the surface area of vegetation to be removed, and the number of plants to be removed by species.
 - iii. Planting Plan – drawn to scale, properly identified resource area and buffer zone and the project site, location of replacement species, comply with AAN, erosion controls, estimated tree canopies after 15 years of growth, name, sizes and locations of trees to be planted, and total area in square feet of the area shaded by the canopies.
 - iv. Existing species list - including number and type of trees and other vegetation (Latin names).
 - v. Replacement species list - including number and type of trees and other vegetation (Latin names).
 - vi. Rationale for Removal.

- vii. Maintenance Plan, which may also reference the ISMP.
 - viii. The Plan shall include monitoring reports submitted annually in June during the three-year monitoring period. The reports shall include photo documentation, the health of new plantings and any mitigation. This report can be combined and submitted with the ISMP report.
- f. The Applicant shall submit for review and administrative approval by the Board a Compensatory Flood Storage Mitigation Plan (CFSMP) for the proposed compensatory flood storage area to mitigate the negative environmental impacts associated with vegetation removal and grading to create this new flood storage area. The goal of the CFSMP is to provide a temporary storage area for floodwater as well as provide important wildlife habitat functions including important food source, shelter, migratory or overwintering areas, and breeding areas for wildlife. This flood storage area shall rectify the current adverse impact of the floodplain by providing a better replacement resource area. Said Mitigation Plan shall provide the following:
- i. A minimum ratio of 2:1 cubic feet of compensatory flood storage of a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which would be displaced by the proposed project.
 - ii. With at least a 3-year vegetation monitoring schedule with an 80% survival rate.
 - iii. Only native non-cultivar species shall be planted on the site to establish a diverse community of ground cover and native woody shrubs and trees.
 - iv. Plants shall be installed and maintained in accordance with standards of the American Association of Nurserymen (AAN). In the event that the AAN ceases to exist or to issue or maintain relevant standards, such plantings shall be installed and maintained in accordance with standards established by a successor organization, if any, and if there is no successor organization, then a generally acceptable standard setting organization satisfactory to the Conservation Commission.
 - v. A monitoring report shall be submitted to the ZBA annually in June during the three-year monitoring period. The report shall include the health of the new plantings and the success of the invasive plant management. The report shall include photo documentation and yearly recommendations for future success.

- vi. If the survival rate of the plantings is less than 80%, the dead, failing, or diseased plantings will be replaced. The Applicant must submit proposed recommendations for replacement to the Board for its review and administrative approval. The Applicant shall submit the contact information of the party responsible for monitoring and maintaining the planted vegetation within the Compensatory Flood Storage area to the ZBA. Should any changes be made to this party, the ZBA shall be notified.
 - vii. If monitoring shows that plant survivorship and health is less than 80% in the third-year report, annual monitoring and replanting will continue until target plant survivorship and health goals are achieved.
 - viii. Maintenance of the compensatory flood storage area shall be a continuing condition in perpetuity that survives the expiration of this permit.
- g. The Applicant shall submit to the Director of Planning and Community Development an Invasive Species Management Plan (ISMP) for work within the AURA, BLSF, and other resource areas and including floodplain compensation areas that exist within the project's work limit. The ISMP shall identify outlining all locations for invasive management, the species and quantities of invasive plants to be managed, and the methods of removal and control of each species. Monitoring reports shall be submitted to the ZBA detailing any invasive species and recommendations for control and removal. The invasive species certified specialist shall evaluate the restoration areas for evidence of colonization by invasive species during prescribed monitoring site visits. Monitoring Reports submitted to the ZBA shall include a listing of any invasive species, and recommendations for control/removal. Invasive Species Management shall be a continuing condition in perpetuity that survives the expiration of this permit.
- h. The Applicant shall submit to the Director of Planning and Community Development a Construction Mitigation Plan including, but not limited to, dust control measures, fill delivery schedules, stockpiling areas, and like matters. This requirement is separate from the Construction Management Plan required by Condition D.2.

- i. Other than site work and such other work as may be authorized in writing by the Director of Planning and Community Development, no other construction of units shall commence, and no building permits shall be issued under this Comprehensive Permit until the Director of Planning and Community Development and other applicable staff has approved the Final Plans as being in conformance with this Decision. If no written response or comments have been given to the Applicant by the Director of Inspectional Services and/or Director of Planning and Community Development concerning the Final Site Plans within forty-five (45) days after the Final Site Plan Submission Date, the Final Plans, as delivered, will be deemed to have been approved.
 - i. The Final Plans shall be in substantial compliance with the Approved Plans.
 - ii. The Final Plans shall include final design and details for the proposed roof stormwater storage system. The limits of rooftop storage shall be delineated and the outlet control for the rooftop storage is to be detailed.
 - iii. The Final Plans shall show designated snow storage areas, consistent with the area shown on the Approved Plans
 - iv. The location of all utilities to all buildings, including but not limited to electric, telephone, and cable, shall be shown on the Final Plans. All transformers and other electric and telecommunication system components shall be included on the Final Plans.
 - v. The Applicant has committed to using all electric service for the senior residential building. If any gas service is to be provided for an emergency generator or other similar facility, or to the duplexes, the gas service location(s) shall be included on the Final Plans.
 - vi. The Final Plans shall provide for the relocation of an existing utility pole, presently located in the area of the proposed driveway for duplex units 3 and 4. Applicant shall also coordinate with the utility company to relocate such pole.

- vii. The Final Plans shall include sign elevations and details, consistent with the sign information shown on the Approved Plans including an entry ground sign at the main access drive, a canopy sign above the entrance to the senior residence building, and additional site directional signage for residents and guests.
- j. The Applicant must provide notification to the Arlington Assessor's Office for address and unit numbering.
- k. In the absence of a signed Memorandum of Understanding (M.O.U.) between the Applicant and the Town of Arlington, the Applicant shall provide a report to the Board indicating the extent of site cleanup operations and the cost of the cleanup operations to date. If there is a signed M.O.U., the terms of that M.O.U. shall supersede this condition.

C.2 Prior to the issuance of any building permits, the Applicant shall:

- a. Record this Comprehensive Permit with the Middlesex South Registry of Deeds, at the Applicant's expense, and provide proof of such recording with the Board.
- b. Submit to the Board and the Director of Planning and Community Development evidence of Final Approval from the Subsidizing Agency (MassHousing), as required by the Project Eligibility letter and the Chapter 40B regulations.
- c. Submit to the Board a copy of the Regulatory Agreement and Monitoring Services Agreement for the Project. Execution and recording of such Regulatory Agreement with MassHousing shall be complete prior to the issuance of any building permit. It is understood and agreed that Monitoring provisions may be included with the Regulatory Agreement, in lieu of a separate Monitoring Services Agreement.
- d. Submit to the Director of Inspectional Services final Architectural Plans prepared, signed and sealed by an architect with a valid registration in the Commonwealth of Massachusetts ("Architectural Plans"). The Architectural Plans shall be submitted in such form as the Director of Inspectional Services may request pursuant to the State Building Code.
- e. Submit to the Director of Inspectional Services and Director of Fire Prevention automatic sprinkler system plans conforming with NFPA 13 and fire alarm system plans conforming to NFPA 72 for the senior rental building. Both systems shall be designed to be monitored by a UL

approved central station monitoring service. The plans shall be submitted in such form as the Director of Inspectional Services and/or Director of Fire Prevention may request pursuant to the State Building Code.

- f. Obtain and file with the Director of Inspectional Services a copy of all required Federal, State, and local permits and approvals required to begin construction of the Project.
- g. Obtain all necessary building, electrical, plumbing, and associated permits required to begin construction of the Project required by state law. It is understood that compliance with this requirement is part of the building permit process, rather than required prior to the issuance of building permits.
- h. The Applicant will be responsible for all applicable sewer permit, capacity impact, and privilege fees. Notwithstanding the foregoing, the Applicant shall not be responsible for any infiltration and inflow ("I/I") fees.
- i. The Applicant will be responsible for all applicable water and sewer system fees as per officially promulgated fee schedules uniformly applicable to all other Town of Arlington projects. Notwithstanding the foregoing, the Applicant shall not be responsible for any infiltration and inflow ("I/I") fees.
- j. Submit to the Board a revised Stormwater Report documenting any changes in design that have occurred during the preparation of Final Plans, if any, that were not included in the Stormwater Report dated August 2021.
- k. Utilizing the methods detailed in Condition I.17, the Applicant shall perform additional test pits at the proposed stormwater basins to confirm groundwater elevations during seasonal high groundwater conditions as confirmed by monitoring nearby USGS wells. These test pits shall be witnessed by the Town and/or its agent. Should revisions to the infiltration system design be required based on additional groundwater investigations, revised plans and stormwater calculations will be provided to the Department of Planning and Community Development for review prior to the issuance of building permits.
- l. In the absence of a signed Memorandum of Understanding (M.O.U.) between the Applicant and the Town of Arlington regarding the final disposition of the Conservation Parcel, the Applicant or its agents shall perform a Phase I Environmental Assessment of all parcels consistent with the requirements of M.G.L. c 21E and EPA standards for Phase I

assessments. Copies of the report are to be submitted to the Board and the Department of Planning and Community Development. In addition, the Applicant shall place \$100,000 in an escrow account under the control of the Department of Planning and Community Development to remove items identified in the report from the Conservation Parcel and dispose of them under state law. If there is a signed M.O.U., the terms of that M.O.U. shall supersede this condition.

- m. In the absence of a signed Memorandum of Understanding (M.O.U.) between the Applicant and the Town of Arlington regarding the final disposition of the Conservation Parcel, should the Phase I Environmental Assessment indicate the possible presence of oil or other hazardous materials on site as defined under M.G.L. c. 21E, the Applicant or its agents shall also perform a Phase II Environmental Investigation of all parcels consistent with the requirements of M.G.L. c. 21E to identify oil or other hazardous materials in the soil or groundwater. Copies of the report are to be submitted to the Board and the Department of Planning and Community Development. The costs associated with the Phase II Environmental Investigation and subsequent site cleanup shall be borne solely by the Applicant. If there is a signed M.O.U., the terms of that M.O.U. shall supersede this condition.

D. Project Design and Construction

- D.1 Prior to the commencement of any work on the Property, the Applicant and the site general contractor shall attend a preconstruction conference with representatives from the Arlington Fire Department, the Department of Public Works (Arlington Water and Sewer Division and Engineering Division), Planning and Community Development and other Town staff and consultants as may be determined. The Applicant and the site general contractor shall host a meeting open to all members of the public to review the construction schedule, hours, policies, procedures, and other neighborhood impacts at least fourteen (14) days prior to the start of construction. Written notice of such meeting shall be provided to parties in interest (pursuant to M.G. L. c. 40A, § 11) at least fourteen (14) days prior to such meeting. Additionally, the Applicant shall prepare a list of additional parties interested in notice, and shall provide notice to such parties.
- D.2 Prior to the pre-construction conference, the Applicant shall submit a Construction Management Plan ("CMP") for administrative approval by the Board. The CMP shall be made available to those receiving notice of the meeting open to the public at least five (5) days prior to such meeting. The CMP shall provide documentation of various construction related activities, including:

1. A Project Description and outline of primary construction tasks,
 2. A Project Schedule including hours of operation, duration of primary construction tasks and estimated completion date,
 3. Project logistics, including staging areas, truck routes, laydown areas, contractor parking, and construction traffic management,
 4. Site Management including noise mitigation, dust control, pest control, and security,
 5. Public Safety and Coordination, including contact information and site inspections,
 6. Coordination with Town to provide construction updates on Project's website, posting on dedicated municipal website, and email notification to registered email addresses.
- D.3 The Applicant shall permit authorized representatives of the Board, as appointed by the Chair, to observe and inspect the Property and construction progress until such time as the Project has been completed and the final occupancy permit issued. Such duly authorized representatives shall adhere to safety precautions imposed by the contractor or the Applicant, inclusive of wearing protective headgear, protective glasses or footwear. Such authorized representatives must acknowledge that they are entering an active construction site and assume the risk thereof.
- D.4 The proposed construction shall be in accordance with applicable Federal and State laws, rules and regulations. Except as waived herein, the proposed construction shall be in accordance with applicable Local laws, rules, and regulations.
- D.5 All site retaining walls four (4) feet or greater in height shall be designed by a Massachusetts Professional Structural Engineer.

- D.6 Prior to construction, a CCTV sewer pipe inspection will be performed along the 14/18' sewer main from the existing manhole located to the west of the proposed resident outdoor/garden area to the manhole located adjacent to the southwest lot corner of 56 Dorothy Road. To the extent the pre-construction CCTV inspection demonstrates that repair is needed, such repair is the responsibility of the Town. Upon completion of the construction, a post-construction CCTV sewer pipe inspection will be performed through this same pipe. Based on the outcome of the post-construction inspection, if it is determined that Project construction caused damage and/or disturbance to the sewer pipe, the pipe shall be repaired/replaced at the expense of Applicant.
- D.7 During construction, the Applicant shall conform to all local, State, and Federal laws and provide advance notice to abutters of the site and abutters to local public ways servicing the site from Lake Street per the Town's Residential Construction Control Agreement regarding noise, vibration, dust, and blocking of Town roads in order to accommodate delivery of materials to the site or for other construction staging purposes. The Applicant shall at all times use all reasonable means to minimize inconvenience to residents in the general area. Adequate provisions shall be made by the Applicant to control and minimize dust on the site during construction in accordance with the construction mitigation plan.
- D.8 The Applicant shall not drive piles in the construction of the building and shall use the least intrusive reasonable alternatives from the point of view of vibration, noise, and inconvenience to the neighborhood. Applicant shall prepare a preconstruction survey of the adjacent houses and shall utilize a geotechnical engineer to perform daily vibration monitoring with seismographs during ground improvement construction to limit peak particle velocity (i.e. vibration level) adjacent to the above-grade existing buildings to frequencies that reduce the probability of structural damage to the adjacent houses to generally acceptable levels specified by the geotechnical engineer. The Applicant shall specify any methods involving subsurface compaction as part of the construction management plan. The Applicant shall keep all portions of any public way used as access/egress to the Project reasonably free of soil, mud or debris deposited due to use by construction vehicles associated with the Project.
- D.9 A temporary sign including the name and address of the project and contact information for the Applicant, general contractor, engineers, architect, and other relevant parties shall be posted at each construction entrance for the duration of construction operations. The sign must be legible and able to be read from Dorothy Road.

- D.10 The Applicant shall install lighting on the site that conforms to the Town of Arlington's Zoning Bylaw and Town Bylaw. Lighting shall be down-lit/shielded to prevent light spillover onto surrounding properties and comply with dark sky requirements. Management of outdoor lighting shall be the responsibility of the Applicant.
- D.11 Utilities, including but not limited to telephone, electric, and cable, shall to the greatest extent feasible be located underground. The general contractor shall be responsible for coordinating all subsurface work with Dig Safe prior to the commencement of any excavation.
- D.12 Soil material used as backfill for pipes, access drives, or structures shall be certified by the Geotechnical Engineer to the Director of Inspectional Services as meeting design specifications, as applicable.
- D.13 The Applicant shall test the soil during construction to confirm soil types in the areas of the infiltration system. Such testing shall be witnessed by the Board's designee. All unsuitable material, if any, discovered in excavation for the infiltration system shall be removed and disposed of in accordance with State and local regulations.
- D.14 Construction activities shall be conducted between the hours of 7:30 a.m. and 4:30 p.m., Monday through Friday and between the hours of 9:00 a.m. and 5:00 p.m. on Saturdays. No construction activities shall be conducted on Sundays or legal holidays. For purposes of this condition, construction activities shall be defined as: start-up of equipment or machinery, delivery of building materials and supplies; delivery or removal of equipment or machinery; removal of trees; grubbing; clearing; grading; filling; excavating; import or export of earth materials; installation of utilities both on and off the site; removal of stumps and debris; loading of construction dumpsters and erection of new structures. All off-site utility work shall be coordinated and approved by the Inspectional Services Department and shall not be subject to the timing restrictions set forth above. Parking of all vehicles and equipment must be on the Property during construction.
- D.15 Burning or burial of construction or demolition debris on the site is strictly prohibited. All such materials are to be removed from the site in accordance with applicable law. During construction, the site shall be secured against unauthorized entry or vandalism by fencing, or other appropriate means, and all construction materials shall be stored or stockpiled on site in a safe manner. Any floodlights used during the construction period shall be located and directed so as to prevent spillover or illumination onto adjacent properties. All construction activities are to be conducted in a workmanlike manner.

- D.16 No building areas shall be left in an open, unstabilized condition longer than sixty (60) days. Temporary stabilization shall be accomplished by hay bales, hay coverings or matting. Final stabilization shall be accomplished by loaming and seeding exposed areas.
- D.17 All dumpsters serving the Project shall be enclosed and covered (with the exception of construction dumpsters used during construction). The Board shall review the dumpster location as part of the approval of the Final Plans if different from what has been shown on the Approved Plans.
- D.18 All retaining walls visible from a public way or direct abutters, as determined by the Director of Inspectional Services based upon the time of year when such walls would be most visible, shall be constructed in an aesthetic manner. Specifically, retaining walls shall avoid the use of exposed concrete to the greatest extent practicable.
- D.19 Snow shall be stored within the areas of the Property designated on the Approved Plans. To the extent snowfall exceeds the capacity of the designated snow storage areas, the Applicant shall truck the excess snow off-site. Snow may not be placed in or adjacent to resource areas. Snow within the resource area may be relocated per the requirements of Condition I.5.
- D.20 The Applicant shall comply with all applicable local, state and federal requirements relating to noise from construction activities, including the regulations contained at 310 CMR 7.10 and the DEP's Noise Policy contained in DAQC Policy 90-001 as well as the Arlington Noise Abatement Bylaw contained at Title V, Section 12, except as specifically waived in this decision. Upon notification from appropriate municipal officials, the Applicant shall cease all construction activities creating noise in excess of state and federal standards, and shall implement such mitigation measures as is necessary to ensure the construction activity will comply with applicable State and Federal requirements.
- D.21 The Applicant is responsible for the sweeping, removal of snow and sanding of the internal roadways, driveways, and sidewalks providing access to both the residents of the Project and emergency vehicles. Neither snow nor sand may be placed in or adjacent to resource areas. The Applicant is responsible for the sweeping, removal of snow and sanding of the public sidewalk along Dorothy Road per local bylaws.
- D.22 The Applicant shall maintain all portions of any public road, whether state or local roads, used for access to the Property by construction vehicles, free from soil, mud or debris deposited due to such use during the duration of construction. The Applicant shall abide by the requirements of Title III, Article 4 *Damage to Ways, Liability Bond* in the Town Bylaws.

- D.23 The Applicant shall comply with DPW requirements regarding curb-cut permits.
- D.24 To the extent earth removal is necessary, the Applicant shall prepare an earth removal plan, showing all necessary cuts and fills, and describing the number of truck trips necessary for the earth removal. A copy of the plan will be kept on file at the jobsite.
- D.25 Prior to commencing any earth removal, the Applicant shall provide the Board with the results of a Phase I Site Assessment pursuant to M.G.L. c. 21E.
- D.26 All catch-basins shall have oil/water separators as shown on the Approved Plans.
- D. 27 Project sidewalks and pathways/walkways shall be compliant with the requirements of the Americans with Disabilities Act ("ADA") and the requirements of the Massachusetts Architectural Access Board ("AAB").
- D. 28 This Comprehensive Permit shall be a master permit which is issued in lieu of all other local permits or approvals that would otherwise be required, except for the issuance of Building Permits and Certificates of Occupancy by the Inspectional Services Department under the State Building Code; provided, however, the Applicant shall pay all local fees for such permits or approvals as published in the Town regulations or bylaws applicable to the Project, including but not limited to building permits, inspections, water and sewer connections, and curb cuts, but not including any I/I fees if such fees were adopted after the filing of the comprehensive permit application.
- D.29 The Applicant shall survey the existing public shade trees along the proposed access routes to the site with the Tree Warden to develop a plan for minimizing impacts to public shade trees in the neighborhood. Any damage to public shade trees shall be reported to the Tree Warden, and the responsible party shall be held accountable under M.G.L. Chapter 87, § 12.
- D.30 Basement and garage portions of the Project which extend below the seasonal maximum high groundwater elevation shall be sealed and waterproofed to protect against the infiltration of groundwater.
- D.33 Construction staging, specifically for the modular units, but applicable to all other aspects of construction such as concrete trucks, shall occur off-site, in a location acceptable to the Director of Inspectional Services. All deliveries to the site shall be offloaded on the Property. Delivery vehicles shall not be permitted to idle. Delivery and construction vehicles shall not block any driveways, private ways, or public ways. The intent of this condition is to prevent traffic congestion and reduce the impact of construction vehicles on the local neighborhood.

E. Construction Completion / Certificate of Occupancy

- E.1 Prior to issuance of any certificate of occupancy for any structure in the Project, the Applicant shall:
- a. Submit engineer's interim certification of compliance with utilities plan and profiles for such Phase (as applicable) to the Director of Inspectional Services.
 - b. Provide a letter to the Board, signed by the Applicant's civil engineer, certifying that the structure and supporting infrastructure has been constructed in compliance with the Final Plans in all material respects.
 - c. Obtain acceptance from the Arlington Fire Department (AFD) of testing of all fire protection systems, fire alarm systems, fire sprinkler systems, and local smoke alarms within the dwelling units of the structure. Obtain acceptance from the AFD for the emergency access drive around the senior living building.
 - d. Obtain a sewer connection sign-off from the Arlington Department of Public Works for the structures.
 - e. Submit a request for legal addresses for all new buildings from the Engineering Division of the Public Works Department.
 - f. In the absence of a signed Memorandum of Understanding (M.O.U.) between the Applicant and the Town of Arlington regarding the final disposition of the Conservation Parcel, following the completion of any remediation identified by the Chapter 21E site assessments, the Applicant shall enter into a Conservation Restriction (CR) under M.G.L. Chapter 184, Sections 31-33 for the portion of the site identified as the Conservation Parcel on the plan entitled "Potential Conservation Parcel" dated August 27, 2021. Such CR shall be in effect in perpetuity and shall limit the use of said parcel to conservation purposes and to a lesser extent, limited passive recreation by the general public.
 - g. Regardless of the status of a M.O.U. between the Applicant and the Town, the proposed CR is to be submitted to the Board for Administrative Review.

- h. In the absence of a signed Memorandum of Understanding (M.O.U.) between the Applicant and the Town of Arlington regarding the final disposition of the Conservation Parcel, the Applicant endorses an agreement to provide an annual contribution of \$25,000 to an escrow account under the control of the Department of Planning and Community Development for a period of ten years for improvements / maintenance of the Conservation Parcel for passive recreation by residents of the Town of Arlington. If there is a signed M.O.U., the terms of that M.O.U. shall supersede this condition.
- E.2 Prior to issuance of the final certificate of occupancy for the Project, the Applicant shall:
- Submit to the Board, in digital file format and full-size paper copies, a final as-built plan including profiles, showing actual-in ground installation of all applicable utilities, rim and invert elevations, roadway, sidewalk and associated construction. The file format shall be both AutoCAD Drawing Format (DWG) and Portable Document Format (PDF). DWG file shall include full model view and individual sheet views. The digital file shall include property boundaries, dimensions, easements, rights-of-way, subsurface features, edge of pavement, edge of sidewalk, edge of water bodies, wetland boundaries, flood boundaries, topographic contours, spot elevations, parking areas, road centerline and associated text. Said digital data shall be delivered in the Massachusetts State Plane Coordinate System, North American Datum 1983 and North American Vertical Datum 1988, in U.S. Survey Feet.
- E.3 For the senior residential building, the Applicant shall provide to the Board evidence of a property management plan (if property management will be done in-house), or shall provide a copy of a contract with a Management Company if property management will be conducted by a third-party. The Applicant shall submit to the Board all information relating to the issues of building security, public access, pet policy, staffing, trash removal, and smoking policies, and other issues addressed in the conditions herein.
- E.4 Within three years after the issuance of a certificate of occupancy, the Applicant shall participate in a post-development monitoring study designed to determine the local traffic on neighborhood streets and to make recommendations regarding traffic calming measures that may be necessary and desirable to mitigate impacts on the streets on and between Lake Street and the project location, which include Lake Street, Wilson Avenue, Littlejohn Street, Homestead Road, Burch Street, Margaret Street, Mary Street, Mott Street, Dorothy Road, and Parker Street.

The study shall be submitted to the Town of Arlington Transportation Advisory Committee ("TAC") for review and approval by TAC and the Arlington Select Board in accordance with the procedure set forth in the Town of Arlington Transportation Advisory Committee Traffic Calming Guideline approved by TAC December 8, 2010 ("Traffic Calming Guidelines"). The Applicant shall cooperate with the Town in implementing all such measures.

F. Traffic / Traffic Safety Conditions / Sidewalks

- F.1 Access and egress to the Project shall be via Dorothy Road and/or Littlejohn Street, consistent with the Approved Plans.
- F.2 The operator of the senior living building is required to include within its vendor contracts requirements that vendors coming to the Property as well as scheduled deliveries to the Property use small, non-articulated delivery vehicles (i.e. no tractor-trailers or similar heavy vehicles). The operator shall use all reasonable efforts to schedule vendor deliveries during off-peak hours. Vendors are to adhere to all local traffic requirements.
- F.3 The senior living residence will provide a complimentary jitney service to the senior living residents and staff, available seven days a week to provide access to and from Alewife MBTA station and other local destinations. The service shall operate for such sufficient operating hours or mode of operation (i.e. on demand or set schedule) to provide reliable transportation service for residents and staff to reduce the demand for parking and vehicle trip generation.
- F.4 The Applicant shall ensure that emergency vehicles can adequately maneuver through the site. The Arlington Fire Department shall review the Final Plans to ensure compliance with this condition.
- F.5 The Applicant shall provide 28 long-term bicycle parking spaces that are covered and secure, together with an additional expansion area within the garage capable of providing long-term bicycle parking for up to eight (8) additional bikes. Bicycle storage fixtures requiring the lifting of a bicycle off the ground shall be provided with mechanical lift assistance.
- F.6 The Applicant shall provide two (2) outdoor short-term bicycle parking racks, each capable of parking up to six (6) bicycles. These parking racks shall be in the proximate area as shown on the Approved Plans, near the main entrance of the senior residence building. Bike racks shall be capable of securing a standard bicycle frame and one wheel using a common U-type security lock without the need to remove either wheel.

- F.7 The Applicant shall provide new residents with transportation information packets including, but not limited to, the following information:
- a. Information on getting around Arlington and surrounding communities sustainably,
 - b. Information regarding the existing weekday peak hour turn restrictions from Lake Street,
 - c. Information regarding local parking requirements and bylaws, including without limitation restrictions on overnight parking,
 - d. Information on the jitney service,
 - e. Information on the Council on Aging shuttle service,
 - f. Information on the Minuteman Commuter Bikeway,
 - g. Information on the MBTA and pass services.
- F.8 The Applicant shall provide 95 total parking spaces for the senior residence building, inclusive of 84 garage parking spaces and 11 surface parking spaces, for a ratio of 0.76 spaces per unit. The parking shall include 8 garage level handicap parking spaces and two surface handicap parking spaces meeting the requirements of the ADA and AAB.
- F.9 Parking for senior residence apartment units shall be subject to an additional monthly fee at market rates, separate from rent, in order to discourage motor vehicle ownership in the Project.
- F.10 The Applicant shall provide electric vehicle charging stations for at least 10 garage parking spaces and shall provide wiring and amperage as needed to allow for an expansion of at least 10 additional garage parking spaces available for future use as vehicle charging stations should the need subsequently arise for more vehicle charging in accordance with tenant demand.
- F.11 Parking for residents, staff, and guests of the senior residence building is to be accommodated primarily on site. The property manager shall review requests for parking quarterly, and shall adjust parking space allocations as required to properly allocate available parking between residents, staff, and guests to minimize impacts on the adjacent neighborhood.

G. Police, Fire, and Emergency Medical Conditions

- G.1 The Applicant shall provide professional senior housing operator / property management and maintenance personnel on the premises during typical business hours and provide an emergency contact name and number for tenants and the Arlington Police Department and Fire Department.

- G.2 Stairwells and garages must be a minimum two-hour fire rated, and residential units must be a minimum one-hour fire rated or as required by State Building Code.
- G.3 The four-story residential structure shall be fully sprinklered per NFPA and State Fire Code regulations.
- G.4 Compliance with all State Building Code and NFPA requirements relating to fire access, safety, and egress shall be met.
- G.5 All elevators must have emergency generator or battery backup per State Elevator Code.
- G.6 The Project shall provide and maintain fire access sufficient to comply with applicable State Building Code and/or Fire Code requirements to enable access for emergency vehicles as approved by the Arlington Fire Department.
- G.7 The Project shall provide adequate exterior lighting to ensure safety of the residents of the Project. Exterior lighting shall conform to the requirements of the local Regulation of Outdoor Lighting [Title V, Section 14].
- G.8 As proposed by the Applicant, the Project shall have an access control system and shall have staff on-site to address access and security concerns.
- G.9 During times of construction, the Project, including all structures shall be accessible to Fire Department and other emergency vehicles. Additionally, all hydrants shall be operational during construction in accordance with NFPA requirements. Standpipes shall be operational on each floor during construction, as required by the Building Code and the Fire Department.
- G.10 The Applicant shall consult with the Fire Department prior to the commencement of construction to provide an on-site emergency plan, which shall be updated as necessary throughout the construction process.

H. Water, Sewer and Utilities

- H.1 The Applicant shall be responsible for the design and installation of the utilities servicing the Project in accordance with the Approved Plans. For the purposes of this set of conditions (Section H), "Utilities" shall be defined as electric service lines, telephone lines, water service lines, CATV lines, municipal conduit and the like.

- H.2 All water and sewer infrastructure shall be installed in conformance with the Arlington Water and Sewer Division's technical requirements. The Applicant shall provide the Arlington Water and Sewer Division with calculations to ensure the distribution system for the area has the necessary capacity to meet system demand required prior to the commencement of construction.
- H.3 Fire hydrants shall be placed as shown on the Approved Plans in locations approved by the Arlington Fire Department. If the Arlington Fire Department approves different hydrant locations, such modification shall be accepted administratively as an insubstantial change pursuant to 760 CMR 56.05(11).
- H.4 The service size for the domestic water service should be verified by the Arlington Water and Sewer Division and information on the fire service size and requirements should be verified by the Arlington Fire Department. The Applicant shall submit information regarding the size of both the domestic and fire services as part of Final Plans, after consultation with the Arlington Water and Sewer Division. Any connections to the Town water main shall be triple-gated and a tee connection.
- H.5 The water and sewer utilities servicing the buildings in the Project shall be installed and tested in accordance with applicable Town requirements and protocols, except as may be waived herein.
- H.6 Utilities shall be installed underground by the Applicant using methods standard to those installations. The Applicant shall request a Grant of Location from the Select Board for any relocation of existing utility poles or installation of new utility poles or underground conduit in the public right of way as needed.
- H.7 The Applicant shall be responsible for all trash, recycling, compost, or yard waste removal from the senior residential building. The Town of Arlington shall not have any responsibility for trash, recycling, compost, and/or yard waste pickup associated with the senior residential building. Applicant shall provide a copy of Arlington's trash and recycling policies and guidelines to all purchasers of the duplex units, which will be serviced by municipal trash, recycling, and yard waste collection.
- H.8 Fire hydrants on the Property shall remain private, and shall be maintained by the Applicant.

- H.9 The Applicant shall allow access to the Town to all easements during the period of construction, and shall not unreasonably deny temporary access to property adjacent to the easement to provide suitable room for the Town to perform all necessary work within the easement. The Applicant shall provide the Arlington Water and Sewer Division with up-gradient sewer flow, with peaking factor, and suitable capacity for proposed additional flow into the sewer system. Sewer service to the senior residence building should utilize an 8" service line and shall discharge into a sewer manhole when entering the Town sewer collection system. Sewer service to the duplex buildings should utilize a 6" service line and discharge into the street main or as directed by the Water and Sewer Division. Upon completion of construction, the Applicant shall notify the Arlington Water and Sewer Division to conduct a post-construction evaluation of the sewer main.

I. Wetlands/Floodplain/Environmental Conditions

- I.1 Prior to commencement of site clearing, preparation, and construction, erosion control measures shall be installed consistent with the Approved Plans.
- I.2 The Applicant will be required to obtain an Order of Conditions pursuant to the Wetlands Protection Act from the Arlington Conservation Commission, or a Superseding Order of Conditions from the Department of Environmental Protection, because the Applicant proposes work within the one hundred foot (100') buffer zone to a bordering vegetated wetland (BVW) and work below the FEMA 100-year floodplain.
- I.3 No uncovered stockpiling of earthen and / or construction-related materials shall be permitted within the one hundred foot (100') Wetland Buffer Zone (also referenced locally as Adjacent Upland Resource Areas ("AURA")) or other resource areas.
- I.4 No heavy equipment may be stored overnight within fifty feet (50') of bordering or isolated vegetated wetland resource areas, and no refueling or maintenance of machinery or vehicles shall be allowed within the one hundred foot (100') Buffer Zone, AURA, or within any bordering or isolated vegetated wetland resource area or Bordering Land Subject to Flooding (BLSF).

- I.5 There shall be no dumping of woody vegetation, leaves, grass clippings, brush, or other debris into a wetland resource area or associated buffer zones. Dumping of snow into wetland resource areas is also prohibited and shall comply with the current Mass. DEP Bureau of Water Resources Snow Removal Guidance. The foregoing does not apply to the clean snow removed from the emergency access road as long as no sand or non-approved de-icing materials are used, and the snow is clear of all foreign debris. An alternative de-icing product such as magnesium chloride (MgCl) may be used as recommended in the Winter Parking Lot and Sidewalk Maintenance Manual published by the Minnesota Pollution Control Agency, <https://www.pca.state.mn.us/sites/default/files/p-tr1-10.pdf>.
- I.6 The Applicant shall hire a qualified Environmental Monitor who will report to the Board and will be on-site as project construction advances. The Environmental Monitor shall submit an electronic report to the Board weekly during site preparation work within the one hundred foot (100') buffer zone to vegetated wetlands, including an update on the functionality and condition of the erosion control measures, until such time that the site is stabilized. The Applicant shall provide the Board with the name(s), address(es) and telephone number(s) of the Environmental Monitor prior to the start of work.
- I.7 While active construction work is underway within the one hundred foot (100') buffer zone, and during the creation of the floodplain compensation area including removal of vegetation including invasive species, final grade establishment, creation of soil profile to support proposed plant species, and restoration of a diversified plant community, the Environmental Monitor shall provide monthly status reports to the Board to confirm that all activities are substantially in compliance with the Comprehensive Permit and Order of Conditions issued by the Arlington Conservation Commission. The ZBA may reduce the frequency of inspections or reports as deemed appropriate. The qualified Environmental Monitor shall also submit an electronic report within seven days after every rain event exceeding 0.5 inches of rain in a 24-hour period to the Board regarding the condition of the Property during and after the rain event. Such report shall also include the status of erosion control measures and any additional measures to address stormwater management caused by said rain event. The qualified environmental monitor will also review the Applicant's SWPPP inspection reports, as appropriate and necessary.

- I.8 All work shall be conducted in accordance with the approved erosion and sedimentation control plan. Within one week of final grading, weather permitting, all disturbed areas located within wetland resource areas and buffer zones shall be stabilized against erosion. This shall be done either by sodding or by loaming, seeding and mulching according to Soil Conservation Service Standards and the Approved Plans. Stabilization will be completed when the surface shows complete vegetative cover. Temporary stabilization measures approved by the Board's inspectional engineer will be required should work be interrupted for more than ten (10) days.
- I.9 The Applicant, successor or assigns shall ensure the cleanliness of all catch basins and roadway affected by the project related activity. All catch basins will be protected by a "Silt Bag Inlet Protection" device or equal during the project work period. The Applicant shall inspect and clean as necessary, all catch basins and sweep the roadway at least weekly during construction. It may be required more frequently during and after rain events. If it is deemed necessary to remove the Silt Bag Inlet Protection to prevent localized flooding and public safety concerns, the Applicant shall notify the Board and Arlington DPW and also the qualified Environmental Monitor.
- I.10 There shall be no sedimentation into wetlands or water bodies located on or off-site from point or non-point source discharges.
- I.11 The Board or its duly appointed agent (which may be the Town Conservation Agent acting on behalf of the Board) shall have the right to enter the Property for inspections and to evaluate compliance with the wetlands conditions contained herein upon reasonable notice of not less than twenty-four (24) hours. Access shall be allowed without the need for advanced notice in emergency situations when necessary to prevent imminent harm to wetlands resource areas.
- I.12 Prior to the commencement of work within any resource areas, the Applicant shall, in addition to any other security or surety required by this Decision, provide the Town security in the amount of \$10,000 (via bond, passbook, cash or tripartite agreement) in order to provide security for the work and erosion control measures in or adjacent to resource areas. In the event that said work or erosion control measures have been deemed to have failed or require maintenance, the Applicant shall be given written notice of such deficiency, along with an opportunity to cure the same within fourteen (14) days. In the event that the Applicant does not timely cure the deficiency or if the Applicant refuses to repair, replace or maintain such erosion control measures in a timely manner upon written notification from the Board or its agent, said security may be accessed by the Board to pay expenses for replacement, repair or maintenance of erosion controls. To the

extent that Board is required to access and use this security, as aforesaid, the Applicant shall replenish said security to return it to \$10,000.

- I.13 Prior to any work commencing on-site, the Applicant shall submit to the Board for review, proof that a Self-Verification Notification Form has been submitted to the US Army Corps of Engineers, if necessary.
- I.14 Prior to any work commencing on-site, the Applicant shall submit to the Board proof that a National Pollutant Discharge Elimination System (NPDES) Construction General Permit is active for the project.
- I.15 Copies of all information and all required reports regarding a US EPA NPDES permit and Stormwater Pollution Prevention Plan (SWPPP) shall be forwarded to the Board via electronic copy.
- I.16 The Applicant shall submit for review and administrative approval to the Town Engineer design details confirming that the rooftop stormwater detention system will conform to the runoff assumptions and calculations in the Applicant's Stormwater Analysis. Any change to the rooftop detention system design will require the approval of the Board.
- I.17 In addition to the provisions of Condition C.2.k, the Applicant shall, through documentation to be submitted to the Board for review, establish seasonal high groundwater elevations at the Property to ensure that there is a minimum of a two-foot separation between the bottom of the stormwater management infiltration chambers and the seasonal high groundwater table. The Applicant shall provide proposed locations and number of test pits and wells to the Board for review and administrative approval. Seasonal high groundwater shall be established based on Volume 2, Chapter 2: Structural BMP Specifications for the Massachusetts Stormwater Handbook, with specific requirements, as follows "Estimate seasonal high groundwater based on soil mottles or through direct observation when borings are conducted in April or May, when groundwater levels are likely to be highest. If it is difficult to determine the seasonal high groundwater elevation from the borings or test pits, then use the Frimpter method developed by the USGS (Massachusetts/Rhode Island District Office) to estimate seasonal high groundwater. After estimating the seasonal high groundwater using the Frimpter method, re-examine the bore holes or test pits to determine if there are any field indicators that corroborate the Frimpter method estimate."
- I.18 The site shall be graded to ensure that no increase in peak runoff rate or volume is directed toward Dorothy Road and Littlejohn Street consistent with the analysis provided in the Stormwater Report dated August 2021 (revised).

- I.19 The Applicant shall retain a qualified professional engineer to oversee the installation of the stormwater system. A stormwater mitigation report shall be submitted to the Board within ten (10) days of the completion of the installation of the stormwater management system. Such stormwater mitigation report shall include as-built plans, photographs from installation, and a written summary of the installation of the stormwater management system, as well as stormwater best management practices (porous pavement, rain gardens, and similar elements throughout the Property).
- I.20 The Applicant shall treat planted areas within resource areas and buffer zones only with slow release nitrogen fertilizer once during the initial planting year. Application of this fertilizer is not permitted within two days before and after storm events. Lawn fertilizer may only be applied twice per year, once in the Spring and once in the Fall, with the exception of the initial planting year. This shall be a continuing condition in perpetuity that survives the expiration of this permit.
- I.21 The application of plant nutrients shall comply with 330 CMR 31.00. No other herbicides or treatment methods may be utilized on the Property unless approved as part of the approved Invasive Species Management Plan. No pesticides or rodenticides shall be used to treat pest management issues within resource areas. This shall be a continuing condition in perpetuity that survives the expiration of this permit.
- I.22 Except as specifically noted in Condition I.5, the application of sand and / or salt within one hundred feet (100') of resource area is prohibited.
- I.23 The Applicant shall conduct a thorough catch basin sump cleaning at all protected catch basins at the end of construction of the Project.
- I.24 All mitigation plantings and all plantings with resource areas shall be native, non-cultivar species, and shall be installed and maintained according to the standards of the American Association of Nurserymen (AAN). In the event that the AAN ceases to exist or to issue or maintain relevant standards, such plantings shall be installed and maintained in accordance with standards established by a successor organization, if any, and if there is no successor organization, then a generally acceptable standard setting organization satisfactory to the Conservation Commission. This shall be a continuing condition in perpetuity that survives the expiration of this permit

- I.25 All plant species planted and invasive species removed through the Project shall be monitored for three years. A survival rate of eighty percent (80%) must be maintained for the approved plantings at the end of the third year of monitoring. If the survival rate is less than eighty percent (80%) after the end of the third year, the Applicant must submit proposed recommendations for replacement to the Board for its review and administrative approval. A monitoring report shall be submitted annually in June for each of the years in the three-year monitoring period, reporting on the health of the new plantings and the success of the invasive plant management. The Applicant shall submit the contact information of the party responsible for monitoring and maintaining the planted vegetation to the ZBA. Should any changes be made to this party, the ZBA shall be notified. This shall be a continuing condition in perpetuity that survives the expiration of this permit.
- I.26 No work shall be allowed in or within twenty-five feet (25') of any resource area except as shown on the Approved Plans.
- I.27 No disturbance shall be allowed in or within fifty feet (50') of any resource area, except as shown on the Approved Plans.
- I.28 Limited activity only is allowed between fifty feet (50') and seventy-five feet (75') to any resource area. Mitigation must be provided for any work between fifty feet (50') to one hundred feet (100') of any resource area. Definitions of "work", "disturbance", "limited activity" and "mitigation" shall be as defined in the Arlington Regulations for Wetlands Protection (2015), Sections 4 and 25.
- I.29 The Applicant shall revise and provide to the Board the Long-Term Pollution Prevention & Operations and Maintenance Plan to include requirements for inspection and cleaning of trench drains and the roof stormwater outlet to ensure these are functional prior to significant rain events as well as maintenance and cleaning of the compensatory flood storage areas to ensure these remain functional and will provide the anticipated flood storage.
- I.30 Any building or site dewatering operations shall conform to the following:
1. The Applicant shall notify the Conservation Commission and DPW that dewatering is required prior to commencing any dewatering operations.
 2. Any catch basins, drains, and outfalls to be used in dewatering operations shall be cleaned out before operations begin.
 3. Any water discharged as part of any dewatering operation shall be passed through filters, on-site settling basins, settling tank trucks, or other devices to ensure that no observable sediments or pollutants are carried into any Resource Area, street, drain, or adjacent property. Filtering is essential to remove any automotive pollutants from the water prior to discharge.

4. Measures shall be taken to ensure that no erosion or scouring shall occur on public or private property, or on the banks or bottoms of water bodies, as a result of dewatering operations. Discharges are to be set back at least fifty feet (50') from BVW and IVW.
5. Dewatering shall not take place in any manner that leads to water being discharged or allowed to flow onto property not under the control of the Applicant without the express written consent of that property owner.

- I.31 The Applicant is to ensure that the proposed rain garden(s) will function as intended pursuant to the stormwater management plan.

J. Other General Conditions

- J.1 This Decision will be deemed to be final upon the expiration of the appeal period with no appeal having been filed or upon the final judicial decision following the filing of any appeal, whichever is later, as per 760 CMR 56.05(12)(a). In accordance with 760 CMR 56.05(12)(c), this Comprehensive Permit shall expire three (3) years from the date that the permit becomes final, unless (i) prior to that time construction authorized by the Comprehensive Permit has commenced or (ii) the time period is otherwise tolled in accordance with law. The Applicant may timely apply to the Board for extensions to the Comprehensive Permit as permitted by law.
- J.2 The Applicant shall comply with all local regulations of the Town and its boards, commissions, and departments unless specifically waived herein or as otherwise addressed in these conditions.
- J.3 The Applicant shall copy the Board on all correspondence between the Applicant and any federal, state, or Town official, board, or commission concerning the conditions set forth in this Decision, including but not limited to all testing results, official filings, environmental approvals, and other permits issued for the Project.
- J.4 This Decision prohibits the parking or storage of any unregistered vehicle on the site, and likewise prohibits the service of any vehicles on the site, except during construction. Overnight parking of vehicles on public ways is prohibited in the Town of Arlington.

- J.5 In the event that the Applicant (or its Management Company) fails to maintain the stormwater management system for the Project in accordance with its operation and maintenance plan, within fourteen (14) days of notification by the Town to the Applicant/Management Company, the Town may conduct emergency maintenance and/or repair, as it deems necessary, and the Applicant shall, prior to the issuance of any certificates of occupancy, convey such easement or other rights in a form mutually acceptable to the Town and the Applicant as may be reasonably necessary to complete such repair and/or maintenance. In the event the Town opts to perform such maintenance in accordance with this paragraph, the Applicant shall reimburse the Town within forty-five (45) days for all of its reasonable expenses related to such work.
- J.6 The Project entrance way and interior roads, and drainage systems associated therewith shall remain private, and the Town shall not have any legal responsibility for the operation and maintenance of such. The Town shall also have no obligations relating to the proposed recreational areas on the Development Parcel, the construction and operation of which shall be the sole responsibility of the Applicant. The Applicant is required to maintain the sidewalk along Dorothy Road clear of snow and other obstructions per local ordinance.
- J.7 Notwithstanding any provisions of the previous condition (J.6), the Town shall have no obligations relating to the restoration and maintenance of the Conservation Parcel except as mutually agreed to in a separate M.O.U.
- J.8 If any default, violation or breach of these conditions by the Applicant is not cured within thirty (30) days after notice thereof (or such longer period of time as is reasonably necessary to cure such a default so long as the Applicant is diligently and continuously prosecuting such a cure), then the Town may take one or more of the following steps: (a) enforcement by the Zoning Enforcement Officer pursuant to G. L. c. 40A, § 7; (b) by mandamus or other suit, action or other proceeding at law or in equity, require the Applicant to perform its obligations under these conditions; or (c) take such other action at law or in equity as may appear necessary or desirable to enforce these conditions. If the Town brings any claim to enforce these conditions, and the Town finally prevails in such claim, the Applicant shall reimburse the Town for its reasonable attorneys' fees and expenses incurred in connection with such claim.

DECISION


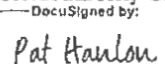
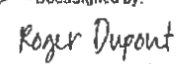
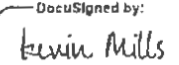
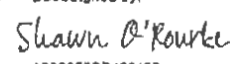
In consideration of all of the foregoing, including the plans, documents, and testimony given during the public hearing, the Board hereby grants the Applicant a comprehensive permit for the construction of twelve (12) ownership units and one hundred, twenty-four

Decision on Application for Comprehensive Permit
Arlington Land Realty, LLC
Off Dorothy Road, Arlington, MA
November 22, 2021
Page 66 of 74

(124) age-restricted rental apartment units pursuant to Chapter 40B, §§ 20-23, for the development described above.

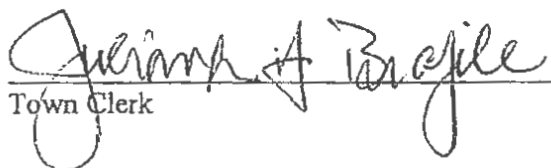
RECORD OF VOTE

The Board of Appeals voted 5-0, at its public meeting on November 22, 2021, to grant a Comprehensive Permit subject to the above-stated Conditions, with this Decision as attested by the signatures below.

DocuSigned by:

05A6A488B8B14C6
Christian Klein, Chair
DocuSigned by:

2415568701524C6
Patrick Hanlon, Vice Chair
DocuSigned by:

CFAFF487D588F1...
Roger DuPont
DocuSigned by:

3FF67067F844493...
Kevin Mills
DocuSigned by:

A8355F70D128409...
Shawn O'Rourke

Dated: November 22, 2021

Filed with the Town Clerk on ^{December 1} November __, 2021.


Town Clerk

Final Decision

Notice: Appeals, if any, by any party other than the Applicant, shall be made pursuant to Massachusetts General Laws, Chapter 40A, s. 17, and shall be filed within twenty (20) days after the filing of this notice in the Office of the Town Clerk, Town Hall, Arlington, Massachusetts. Any appeal by the Applicant shall be filed with the Housing Appeals Committee pursuant to G. L. c. 40B, § 23, within twenty (20) days after the filing of this notice in the Office of the Town Clerk.

DECISION ON WAIVERS

The Board takes the following action on the waiver requests of local rules and regulations submitted by the Applicant as it has determined necessary for the construction of the Project as approved by the Board:

1. Town of Arlington Bylaws, Title III, Article I, Sections 1 and 2 "Use of Streets for Construction or Demolition Materials": This section requires a permit from the Board of Public Works or Town Engineer, and included bond requirements, for work adjacent to public ways and for the use of public ways to place building materials and/or rubbish. The Applicant requests a waiver except from the bonding requirements.

Board Action: Waiver Denied. The Applicant has requested a waiver of the procedural requirements of this section, a waiver that is unnecessary for a comprehensive permit application, as all other local approval processes are subsumed into the comprehensive permit application. The Applicant has not set forth any substantive waiver requests of this section, therefore no such waivers are granted.

2. Town of Arlington Bylaws, Title V, Article 8, and Town Wetland Protection Regulations "Wetland Protection Bylaw" and "Wetland Regulations of the Town of Arlington Conservation Commission dated June 4, 2015): The Applicant requests a waiver of the procedures, jurisdictional requirements, applications, fees, costs, regulations, policies, and enforcement, consultant fees of the Wetlands Bylaws and Regulations.

Board Action: Waiver Denied. To the extent that this waiver request constitutes a request for a waiver of the procedural requirements under the Wetlands Bylaw and Wetlands Regulations, this request is denied as unnecessary, as the procedural requirements of other local permitting processes are subsumed into the comprehensive permit process. To the extent that this waiver request seeks substantive waivers (such as jurisdictional requirements, policies, etc.), this waiver request is overly-broad and is therefore denied.

3. Wetlands Protection Bylaw, Section 2, and Wetlands Regulation Sections 2(A)(5), 4(3) and 4(7), Areas Subject to jurisdiction under local bylaw/definitions of same: The Applicant requests a waiver of these sections to waive the Area Adjacent to Upland Resource Area "AURA" as a resource area, to allow portions of the AURA to be graded, completed as compensatory floodplain storage and/or emergency access areas, as shown on the Approved Plans.

Board Action: Waiver Granted to allow work within the AURA as shown on the Approved Plans. The request to waive the AURA as a resource area in general is denied.

4. Town of Arlington Wetlands Regulations, Section 24 "Vegetation Removal and Replacement": This section requires an application process in which the Applicant must list all species existing and all proposed replacement species within resource area, including specific requirements for deciduous trees, evergreen trees and shrubs. The Applicant requests a waiver to allow for the Applicant to provide a detailed re-vegetation plan of all areas not otherwise permanently altered for emergency access road or those portions of the southerly side of the building within the floodplain, and to allow a re-vegetation plan acceptable with industry standards.

Board Action: Waiver Denied. The Project is providing habitat restoration in the location of the 2:1 floodplain compensation area and also some grading / re-vegetation of the outer AURA. Such restoration and re-vegetation efforts should follow the guidance provided by the Regulations in Section 24 for protection of resource areas. Establishment of a healthy diversified native plant community within the 2:1 floodplain compensation area will provide a resilient habitat within a resource area that protects the interests it must replicate including protection of flood control, groundwater, and wildlife habitat. The guidance found in Section 24 Vegetation Removal and Replacement is critical to the long term success of this mitigation area, whereby providing important public benefit.

5. Town of Arlington Wetlands Regulations, Section 25 "Adjacent Upland Resource Areas": This section regulates the 100-foot buffer zone to resource areas. The Applicant requests a waiver to allow for grading and compensatory flood storage as shown on the Approved Plans, and for limited permanent impacts to the outer AURA area for emergency access road, and portions of the garage structure. No alteration will occur within 25' to a state-listed wetland resource area.

Board Action: Waiver Granted to allow work within the AURA as shown on the Approved Plans. The request to waive the AURA as a resource area in general is denied.

6. Town of Arlington Bylaws, Title V (Regulations Upon Use of Private Property), Article 8, Section 11 “Bond to Secure Corrections of Flooding Conditions”: This section requires an applicant to post a bond where a structure in excess of 6,000 square feet in area is proposed within two hundred yards of an existing stream or wetland to post a proper bond sufficient in the opinion of the Commission to secure performance of measures necessary to correct any flooding conditions resulting from the construction. The Applicant requests a waiver of this provision.

Board Action: Waiver Denied. Board requests a bond in the amount of \$173,900 as detailed and recommended in the September 20, 2021 memorandum from BETA Group.

7. Town of Arlington Bylaw, Title V, Section 8 “Wetlands Consultant Fees”: This section allows the Conservation Commission to impose fees upon an applicant to cover the cost of the Commission retaining an outside wetlands consultant to review the Applicant’s submittals. The Applicant requests a waiver of this requirement.

Board Action: Waiver Denied as unnecessary. The comprehensive permit doesn’t take away the Conservation Commission’s ability to review the application under the Wetlands Protection Act.

8. Town of Arlington Bylaw, Title V, Article 9 “Placement of Dumpsters”: This section requires a permit to be issued by the Select Board for the placing of dumpsters or portable storage containers. The Applicant does not request any substantive waivers of this provision, seeking only a waiver of the procedural requirement of obtaining a permit from the Select Board.

Board Action: Waiver Denied as unnecessary. The dumpsters will be internal to the apartment building per the provided plans.

9. Town of Arlington Bylaw, Title V, Article 15, Sections 1-5 “Stormwater Mitigation” – This section requires Engineering Division review and approval of proposed stormwater systems. The Applicant has proposed to manage stormwater in accordance with the MassDEP’s Stormwater Policy and Technical Guidance, unless otherwise exempt. Stormwater to also be managed in accordance with a US EPA Stormwater Construction Permit for Massachusetts.

Board Action: Waiver Denied as unnecessary. Because all local permitting processes are subsumed into the comprehensive permit application, no waiver of this provision is required.

10. Town of Arlington Bylaws, Title V, Article 16 “Tree Protection and Preservation”: This section requires approval of the Tree Warden prior to commencement of site work.

The Applicant requests a waiver of the procedural requirement of obtaining approval of the Tree Warden. The Applicant does not request any substantive waivers of the requirements of this section.

Board Action: Waiver Denied as unnecessary. Because all local permitting processes are subsumed into the comprehensive permit application, no waiver of this provision is required. The Applicant has agreed to comply with the substantive provisions of this bylaw. The Tree Plan shall be submitted as a part of the Final Plans.

11. Town of Arlington Bylaw, Title IX, Article 3, Sections 4A and 4B “Town Fees and Charges, Department of Community Safety and Office of Building Inspector”: These sections set forth local fees and charges. The Applicant requests a waiver of 25% of local fees to reflect the 25% affordable housing units for the Project.

Board Action: Waiver Denied.

12. Water Connection Fee Regulations “Water Privilege Fee”: This section details the required fees for water connections. The Applicant requests a waiver of 25% of these fees to reflect the 25% affordable housing units in the Project.

Board Action: Waiver Denied.

13. Sewer Privilege Fee: This section details the required fees for connection to the municipal sewer system. The Applicant requests a waiver of 25% of these fees to reflect the 25% affordable housing units in the Project.

Board Action: Waiver Denied.

14. Arlington Zoning Bylaws, Article 2 “Definitions”: The Applicant requests the waiver of various unspecified definitions in this section.

Board Action: Waiver Denied. The Applicant has not submitted sufficient information for the Board to make an informed decision on this waiver request, therefore a denial is required.

15. Arlington Zoning Bylaws, Article 4.02 “Application of Zoning Bylaws”: This section states that the Zoning Bylaws shall apply to the erection, construction, reconstruction, alteration of use of building structures or use of land. The Applicant requests a waiver to allow the erection of a multi-family residential structure, along with the accessory uses thereto, including parking, play area, terraces, landscaping and management office as shown on the Approved Plans.

Board Action: Waiver Granted to allow construction as shown on the Approved Plans.

16. Arlington Zoning Bylaws, Article 5, Sections 5.03 and 5.04 "Use Regulations": The Applicant notes in its list of requested waivers that multi-family dwelling structures are allowed in the PUD Zoning District pursuant to the issuance of a special permit. The Applicant also notes that no waiver of special permit requirements are required for a comprehensive permit development. The Applicant has listed no substantive provisions of these sections that require waivers.

Board Action: Waiver Denied as unnecessary. Because G. L. c. 40B, §§ 20-23 subsumes all other local permitting processes, the Applicant is not required to obtain a special permit for the Project. Since the Applicant has detailed no substantive waivers of these sections that are necessary, the waiver request is denied.

17. Arlington Zoning Bylaws, Article 6, Section 6.00 "Dimensional and Density Regulations" This section regulations minimum lot size, frontage, maximum floor area, maximum lot coverage, minimum lot area, minimum lot depth (front, side and rear), maximum heights, minimum landscaped areas and useable open space.

Board Action: Waiver Denied. The Board addresses the more specific waiver requests below.

18. Arlington Zoning Bylaws Article 6 "Table of Dimensional and Density Regulations": The Applicant requests a waiver of the Front Yard and Side Yard Setback under Section 6.28, requiring 25 foot setback for each. The front yard setback proposed for the townhomes on Dorothy Road is 20 feet and the southwest corner of the senior residential building rear yard setback is 18.7 feet from the lot line, due to the odd configuration of the property lines; no adjacent buildable property is impacted by the rear yard setback waiver.

Board Action: Waiver Granted to allow construction as shown on the Approved Plans.

19. Arlington Zoning Bylaws, Article 6, Section 6.07 "Buildings in Floodplains": This section requires the issuance of a special permit for buildings within floodplains. The Applicant requests a waiver of this special permit requirement. No substantive waivers of this bylaw were requested.

Board Action: Waiver Denied as unnecessary. Applicant is not required to obtain waivers of special permit requirements, as all other local permits are subsumed into the comprehensive permit.

20. Arlington Zoning Bylaws, Article 6, Section 6.30 "Open Space Regulations for Planned Unit Developments": This section sets forth a minimum requirement of 10% landscaped and 10% useable open space for apartments in the PUD Zoning District. The Applicant requests a waiver to allow for less than 10% useable open space.

Board Action: Waiver Granted to allow construction as shown on the Approved Plans.

21. Arlington Zoning Bylaws, Article 7, Section 7.06, 7.073 Signs Permitted in any B, I or PUD District: This section allows for one sign for each street or parking lot frontage. No more than 2 permanent signs for any one business or industrial establishment. Allows for one directory sign of occupants/tenants. The Applicant requests a waiver to allow for entry sign at main access drive on Dorothy Road, with additional internal signage to direct residents/guests to main entrance (freestanding); direct to parking garage (freestanding); and a canopy sign above entrance to Independent Living building,

Board Action: Waiver Granted only to allow the Applicant (1) Ground Sign not to exceed 24 sq. ft and (1) Canopy Sign not to exceed the size of the face of the proposed entry canopy. Directional and other signs are to be limited to 2 sq. ft. per sign. Sign locations to be as shown on Approved Plans.

22. Arlington Zoning Bylaws, Article 8, Section 1 "Off-Street Parking Requirements": The Applicant requests a waiver of the minimum parking requirements (1 space per efficiency unit, 1.15 per single bedroom and 1.5 spaces per two-bedroom unit and 2 spaces per three-bedroom unit) to allow for a parking ratio of no less than 0.76 spaces per unit associated with the senior residential building. The two end units in the row of duplex buildings along Dorothy Road can only accommodate one parking space each.

Board Action: Waiver Granted to allow construction as shown on the Approved Plans.

23. Arlington Zoning Bylaws, Article 8, Section 8.12 "Parking/Loading space standards": This section limits the number of compact spaces to 20% (via special permit). The Applicant requests a waiver to allow approximately 25% of the parking spaces to be compact spaces.

Board Action: Waiver Granted to allow construction as shown on the Approved Plans.

24. Arlington Zoning Bylaws, Article 10, Section 10.02: This section prohibits permits from being issued for structures that do not comply with the substantive provisions of the Arlington Zoning Bylaws. The Applicant requests a waiver to allow permits to issue for

the structures as approved by the comprehensive permit decision.

Board Action: Waiver Granted to allow construction as shown on the Approved Plans.

25. Arlington Zoning Bylaws, Article 10.11 "Special Permits": This section sets forth the special permit review requirements for the Board or the Arlington Redevelopment Board, and limits the duration of special permits to two (2) years. The Applicant requests a waiver of the procedural requirements for special permits, and also requests a waiver of the two (2) year lapse provision.

Board Action: Waiver Denied as unnecessary. Because a comprehensive permit subsumes all other local permitting processes, a waiver of the special permit process is not required. The Board grants the substantive waiver of the two-year lapse provision contained in Section 10.11, so that the comprehensive permit shall lapse if substantial use has not commenced within three (3) years, as set forth in 760 CMR 56.05(12)(c).

26. Arlington Zoning Bylaws, Article 10, Section 10.12 "Variances": This section sets forth the criteria for the grant of variances pursuant to M. G. L. c. 40A, § 10. The Applicant requests a waiver of the variance process.

Board Action: Waiver Denied as unnecessary. The Applicant is not required to obtain variances as part of a comprehensive permit application. Therefore the provisions of Section 10.12 are not applicable to this application.

27. Arlington Zoning Bylaws, Article 11, Section 11.04(a-g) "Floodplain District": This section imposes a special permit requirement upon uses within the Floodplain District. The Applicant requests a waiver of this special permit requirement.

Board Action: Waiver Denied as unnecessary. The Applicant is not required to obtain waivers of special permit requirements, as all other local permits are subsumed into the comprehensive permit.

28. Arlington Zoning Bylaws, Article 11, Section 11.05(b), (d) and (f): This section requires a special permit for specific uses and structures in the Inland Wetland District. The Applicant requests a waiver of this special permit requirement.

Board Action: Waiver Denied as unnecessary. The Applicant is not required to obtain waivers of special permit requirements, as all other local permits are subsumed into the comprehensive permit.

29. Arlington Zoning Bylaws, Article 11, Sections 11.06(b), (d)(1), (d)(4), (d)(5), (d)(6), (e), and (f) "Environmental Design Review": This section sets forth a special permit process for projects subject to Environmental Design Review. The Applicant requests a waiver of the special permit process and review standards. The Applicant also requests a substantive waiver of the signage requirements to allow for temporary construction signage as allowed by the Building Inspector.

Board Action: Waiver denied as unnecessary. The Applicant is not required to obtain waivers of the procedural requirements for special permits pursuant to 760 CMR 56.05(7).

30. Arlington Zoning Bylaws, Article 11, Section 11.08 "Affordable Housing Requirements": This section requires 15% of new residential units be restricted as affordable units. The Applicant requests a waiver to allow compliance with the requirements of the Subsidizing Agency.

Board Action: Waiver Granted.

31. Zoning Board of Appeals Comprehensive Permit Regulations, Section 3.1 and 3.2 "Application and Documentation": The Applicant requests a waiver to allow for an application that does not comply with the requirements of Section 3.0; substantive compliance with the Application/Documentation was received by the Board during the course of the public hearing.

Board Action: Waiver Granted.

32. Arlington Town Bylaws, Title V, Article 12, Section 3.A "Noise Abatement": This Section prohibits operation of heavy equipment outside of the hours of 8:00 a.m. Monday through Friday, and from 9:00 a.m. to 5:00 p.m. on Saturdays, Sundays, and legal holidays. The Applicant requests a waiver to allow for construction hours of 7:30 a.m. to 4:30 p.m. on Monday through Friday, and 9:00 a.m. to 5:00 p.m. on Saturdays.

Board Action: Waiver Granted as Conditioned by the Board. Waiver Granted as Conditioned by the Board. This waiver to allow hours of operation beginning at 7:30 a.m. on weekdays is contingent on the limitation prohibiting work on Sundays or legal holidays contained in Condition D.16. If the prohibition against work on Sundays or legal holidays is subsequently stricken from this decision, this waiver shall cease to be operative.

END OF DECISION

Attachment G

Thorndike Place Residential Community
Arlington, Massachusetts
Notice of Intent

WILDLIFE HABITAT EVALUATION

Wildlife Habitat and Vegetation Evaluation

Thorndike Place

Dorothy Road

Arlington, MA

November 2020



Prepared for:
Arlington Land Realty, LLC

Matt Burne, PWS
Senior Ecologist
BSC Project No. 23407.00

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Attachment B: Thorndike Place Wildlife Habitat and Vegetation Analysis Images

Attachment C: Field Data Collection Forms

1.0 INTRODUCTION

The Thorndike Place Comprehensive Permit Civil/Site peer review conducted by BETA, dated August 5, 2020, identifies several concerns pertaining to wildlife habitat and vegetation on the project site, making several recommendations for thorough wildlife habitat and vegetation evaluation.

Recommendations include providing a field evaluation of functions and values of the Isolated Vegetated Wetland (IVW) and Arlington Bylaw Adjacent Upland Resource Areas (AURAs) to determine the area's significance to interests identified in the [Arlington] Bylaw and to conduct a wildlife habitat evaluation of the 17.7-acre site focusing on resource areas and potential loss of habitat within isolated wetlands and AURA zones.

The Arlington Regulations for Wetlands Protection (June 4, 2015) define wildlife as any non-domesticated mammal, bird, reptile, amphibian, fish, mollusk, arthropod or other invertebrate [that is not a pest], and wildlife habitat as an area being used by or necessary to provide breeding or nesting habitat, shelter, food and water for any animal species.

The Massachusetts Wetlands Protection Act (WPA) defines wildlife somewhat more restrictively as all mammals, birds, reptiles and amphibians, and additionally any state-listed species (which includes invertebrates). The WPA regulations identify the important wildlife habitat functions that wetlands provide as food, shelter, migratory or overwintering areas, or breeding areas for wildlife. The regulations further recognize that it is the topography, soil structure, plant community composition and structure, and hydrologic regime that provide important wildlife habitat functions.

This report presents the findings and analysis of a field investigation of the wildlife habitat and vegetation of the Thorndike Place project site conducted on October 27, 2020 by BSC Senior Ecologist Matt Burne, PWS. Matt holds a Master of Science degree from the University of Massachusetts Amherst in Fisheries & Wildlife Conservation and was previously employed by the Massachusetts Natural Heritage & Endangered Species Program as a Vernal Pool Ecologist and Rare Species Environmental Review Biologist for almost ten years.

2.0 METHODS

2.1 DESKTOP REVIEW AND FIELD PREPARATION

Prior to conducting field data collection, a desktop assessment of the site was conducted to identify existing known resources of potential interest including:

- Rare species habitat, Massachusetts Natural Heritage and Endangered Species Program (NHESP)
- BioMap2 Core Habitat, NHESP
- Critical Natural Communities, NHESP
- Prime Agricultural Soils, Natural Resources Conservation Service
- Current and historic aerial photography, Google Earth
- Wetlands, as mapped by BSC Group
- Flood zones, Federal Emergency Management Agency (FEMA)
- Areas of Critical Environmental Concern (ACEC), Department of Conservation and Recreation
- Important Bird Areas (IBA), National Audubon Society

Field survey points were identified in advance of field work with attention to the proposed project footprint where impacts to AURA are proposed or are immediately adjacent, to flood plain areas within the proposed project footprint, and to potentially suitable locations for compensatory storage (Attachment A).

2.2 FIELD SURVEY

A site visit was conducted on October 27, 2020 to collect data on the vegetation characteristics and important wildlife habitat features of the project site. At each field-located survey point, a 25-foot radius plot was established and vegetation was characterized within the survey plot (field forms attached as Attachment C). Field Forms developed by the Massachusetts Natural Heritage & Endangered Species Program for Quantitative Community Characterization were used to collect standardized data within each survey plot.

In addition to vegetative characterization, each survey plot was searched for signs of wildlife and for any additional features that provide important wildlife habitat values.

Survey plot center points were recorded using the ArcGIS Field Data Collector application, with GPS accuracy of approximately 15 feet under the forest cover. Photographs were collected at each survey point to create a visual record of conditions.

3.0 RESULTS

3.1 OVERVIEW

Much of the site is characterized by a diverse, mature forest canopy with dense understory vegetation. There are many very large specimens of Silver Maple (*Acer saccharinum*) and Cottonwood (*Populus deltoides*) throughout the property, especially near the series C wetland and on the eastern portion of the project site, near Parker Street. Several invasive exotic plant species are found throughout the site, with Garlic Mustard (*Alliaria petiolata*) especially common in the understory.

In many ways, the site is generally typical of urban forest fragments. In total, the forested area of the subject site and surrounding parcels that remain under forest canopy is approximately 18.5 acres. The setting of the forest patch that remains on this site is urban, though there is a tenable green-way connection to the bike path that leads north to Spy Pond, a Natural Heritage & Endangered Species Program BioMap2 Core Habitat and Priority Habitat polygon (PH 1421) and to the Alewife Brook Reservation, which connects to the Mystic River to the north. These connections have tree cover and are generally considered green space, though there is a heavy human presence in both corridors, and they are notably narrow.

This forest fragment is therefore not entirely isolated, despite the dense development surrounding it and the presence of the Route 2 corridor to its south, which isolates it from open space connected to Little Pond and Alewife Brook to the south. There is no direct connection to the Important Bird Area at Fresh Pond to the south in Cambridge.

Evidence was detected of several common bird species and a small number of mammals typical of urban woodland patches. There were no amphibians or reptiles encountered during the site visit, but it is recognized that late October is late in the year for encountering these groups of organisms.

It is important to acknowledge the extensive encampment of homeless persons on the subject parcel, as this has a direct and significant impact on the wildlife habitat values of the property overall. In general, wildlife species will not cohabitate with humans, and the presence of the large encampment and extensive areas of trash and waste spread throughout site depress any wildlife habitat values that may exist in this fragmented and isolated forest patch.

3.2 DESKTOP REVIEW AND FIELD PREPARATION

The status of the resources that are mapped or described by the reference material reviewed for the desktop assessment are summarized below in Table 1.

Table 1: Results of Desktop Resource Review

Resource	Source*	Present/Type	Comments
Rare Species Habitat	NHESP	Not present	Project site is not within mapped Priority Habitat or Estimated Habitat for rare species, as mapped in the current NHESP Rare Species Habitat Atlas (2017).
BioMap2 Core Habitat	NHESP	Not present	Project site is not within mapped BioMap2 Core Habitat, as mapped by NHESP and available through OLIVER, the MassGIS data viewer.
Critical Natural Communities	NHESP	Not present	Project site is not located within a mapped Critical Natural Community, as mapped by NHESP and available through OLIVER, the MassGIS data viewer.
Prime Agricultural Soils	NRCS	Present	Portions of the project site are mapped as Swansea Muck, identified as a Farmland of Unique Importance.
Current and historic aerial photography	Google Earth, historicalaerials	1938, 1955, 1995 - 2018	See discussion of aerial imagery below
Wetlands	MA DEP, Parcel Specific Delineation	Present	BSC has delineated wetlands on the project site.
Flood zones	FEMA	Present	Portions of the project site lie within FEMA Zone AE
Areas of Critical Environmental Concern (ACEC)	MA DCR	Not present	Project parcel does not lie within mapped ACEC, as indicated by the current data available through OLIVER.
Important Bird Areas (IBA),	NAS	Not present	The project parcel does not lie within an IBA, and the nearest mapped IBA is Fresh Pond, approximately 1200 meters away. An additional IBA, the Mystic Valley Watershed, is mapped within 1800 meters.

*Full Organizational names:

NHESP – Natural Heritage and Endangered Species Program

NRCS – Natural resources Conservation Service

MA DEP – Massachusetts Department of Environmental Protection

NAS – National Audubon Society

3.2.1 Historical Site Context

Aerial photography available on Google Earth was reviewed to evaluate changes in land use and cover type. The earliest imagery provided on the Google Earth platform was from 1995, and this image shows no change in the landscape context or use of the property over the twenty-five year period available for review.

Using historicalaerials.com, we were able to review aerial photography from 1938 and 1955, and subsequent years leading into the modern era. In the late 1930s, the property was in active farming with a

number of distinct fields defined. Route 2 had been established several years prior (1935 or so) cutting off everything to the south of the property, and housing development was beginning to hem in the property from the north, though there was still a partial connection to the Spy Pond area with the exception of housing along Lake Street which fragmented the property from Spy Pond.

By 1955, farming had clearly been abandoned on the property, and more intensive housing development had occurred in the neighborhood of Dorothy Road and Littlejohn Street. In fact, by 1955, all of the housing in the neighborhood directly north of the property was in existence.

This parcel continued to revert to forest on the abandoned agricultural fields following the 1930s, and has been physically isolated from other natural areas for nearly 100 years.

3.2.2 Wetlands

Wetland delineations for this project site have been conducted and contested several times over nearly 20 years. We carefully reviewed current delineations and FEMA floodplain designations to plan survey plot locations to provide useful characterization of the parcel with respect to the current, significantly reduced Revised Site Plan (September 28, 2020).

The revised plan proposes no impact to Isolated Wetland (local), Bordering Vegetated Wetland, 25' No Disturb Zones for Isolated or Bordering Vegetated Wetlands, and significantly reduces proposed impacts to 100' Buffer and AURA associated with Bordering Vegetated Wetland and to Floodplain resources on the site.

Field data collection was planned for four (4) locations in AURA-BVW, three (3) locations in FEMA Floodplain, two (2) locations in possible Compensatory Flood Storage sites, and one (1) location in a very small Isolated Area on the northeast of the site that has been delineated as a wetland previously and which has had some question raised about possible function as a vernal pool. Two of the ten survey points were situated within the encampment and were therefore not included in the survey (see below).

3.3 FIELD SURVEY

3.3.1 AURA Survey Locations

AU-B9 Terrestrial deciduous forest with dense shrub layer
 Tree canopy 35% cover composed of Ash (20%), Norway maple (10%), Black Locust (5%)
 Shrub layer 20% cover composed of rose (15%), Chokeberry (Tr)
 Vines present include Oriental Bittersweet (20%)
 Herbaceous layer 70% composed of Garlic Mustard

Topography is gently sloping, dry loamy soil with thin litter and duff layer
 There is a large amount of downed woody debris (30% cover) with a high fuel load
 One snag > 4" DBH; few cavities observed
 Few small mammal burrows observed

Evidence of dumping including concrete and macadam
 Extensive invasive exotic plants

- AU-C10 Terrestrial deciduous forest with well-developed shrub layer
Tree canopy 75% composed of Silver Maple (50%), Poplar (10%), Ash (10%) and Cherry (Tr)
Shrub layer 20% cover composed of Box Elder (10%), Elm (10%)
Vines including Oriental Bittersweet and grape present (20%)
Herbaceous layer composed of Garlic Mustard (70%) and Japanese Knotweed (20%)

Topography is gently sloping toward C-series wetland
There is a large amount of downed woody debris (40% cover) with moderate fuel loads
Three snags > 4" DBH, few cavities observed
No small mammal burrows observed

Evidence of human disturbance including refuse
Extensive exotic invasive plants

- AU-C16 Terrestrial deciduous forest
Tree canopy 65% cover with Tree of Heaven (30%), American Elm (10%), and Cherry (5%)
Tree sub-canopy layer composed of very old fruit trees (25%)
Tangled shrub layer of Amur Honeysuckle (5%), vines (20%) including Bittersweet
Herbaceous layer 75% cover composed of Garlic Mustard

Topography is gently sloping toward C-series wetland
There is a small amount of downed woody debris (15%) with moderate fuel loads
No snags >4" DBH; no cavities observed
No small mammal burrows observed

Significant amount of trash and waste materials in this location
Extensive exotic invasive plants

- AU-D18 Terrestrial deciduous forest with relatively open understory
Tree canopy 75% composed of Black Cherry (70%) and Silver Maple (5%)
Tree sub-canopy and shrub layer 30% with Black Cherry, Poison Sumac, and Tree-of-Heaven
Shrub and herbaceous layer 60% composed of American Pokeweed, Goldenrod, Buckthorn

Topography is essentially flat
There is only a trace amount of downed woody debris with a moderate fuel load
There are several snags >4" DBH (Tree-of-Heaven) and Cherry; few cavities
No small mammal burrows observed

Immediately adjacent to the largest encampment on the property.
Survey Plot has the least Garlic Mustard on the site
Evidence of dumping including concrete and macadam
Impact of highway evident

3.3.2 Floodplain Survey Locations

- FP-1 Terrestrial deciduous forest with moderate understory
 Tree canopy 80% composed of Cherry (60%), Box Elder (20%) and Black Oak (5%)
 Understory composed of brambles, Chokecherry (10%), American Pokeweed (10%)
 Herbaceous layer 80% composed of Garlic Mustard (70%), Goldenrod (5%)
- Topography is generally flat
 There is a moderate amount of downed woody debris (25%) and moderate fuel load
 One snag 4" DBH present
- Invasive exotic shrubs/vines are present but sparse, including Bittersweet, Knotweed
 There are abundant plants that produce food for wildlife
 Some evidence of the homeless encampment, including trash within survey plot
 Evidence of dumping including concrete and macadam
- FP-2 Terrestrial deciduous forest with fairly open understory
 Tree canopy 80% with Ash (20%), Norway Maple (40%), Red Maple (10%), Elm (5%)
 Tree sub-canopy and shrub layer composed of Cherry (5%), Norway Maple (5%)
 Herbaceous layer 90% composed of Garlic Mustard, Sensitive Fern, ivy
- Topography is generally flat
 Small amount of downed woody debris, including 18" DBH trunk, moderate fuel load
- Survey plot includes some very large trees, including specimens of 24" and 30" DBH
 Site is close to Dorothy Road and there is evidence of yard waste dumping
 Evidence of dumping concrete macadam
- FP-3 Located within encampment and therefore not surveyed

3.3.3 Possible Compensatory Storage Locations

- CS-1 Terrestrial deciduous forest with open understory
 Tree canopy 100% composed of Norway Maple. Elm and Cherry present (Tr)
 Understory has trace amount of Linden and Bittersweet
- Topography gently sloping to the west
 Small amount of downed wood debris (5%) with moderate fuel load
 No snags observed; no cavities observed
 No small mammal burrows observed
- Some residential encroachment of lawn area, but no other evidence of impacts
 Garlic mustard is present outside of plot at fence line
- CS-2 Located within encampment and therefore not surveyed

3.3.4 Isolated Area

- IA-1 Distinct topographic depression
Cottonwood trees on edge of basin
Knotweed and ferns in basin

This was evaluated for vernal pool habitat potential and does not meet such criteria

3.3.5 Wildlife Observations

Few animals were observed during the field survey on October 27, 2020. A dead Eastern gray squirrel (*Sciurus carolinensis*) was observed at the forest edge, opposite 65 Dorothy Road. An Eastern Cottontail rabbit (*Sylvilagus floridanus*) was observed near Plot IA-1. Fresh canid scat was found at Plot AU-B9. It is believed to be that of Eastern Coyote (*Canis latrans*), given apparent contents of the droppings (Photo AU-B9 #867).

Several birds were heard or observed within the forested parcel. Species included Northern Cardinal (*Cardinalis cardinalis*), Black-capped Chickadee (*Poecile atricapillus*), Blue Jay (*Cyanocitta cristata*), Downy Woodpecker (*Picoides pubescens*) and American Robin (*Turdus migratorius*).

Residents of the abutting neighborhood have stated that they have observed increased pest species activity, including rats. No evidence of rats or other pest species was observed during the field survey.

4.0 SUMMARY OF FINDINGS

4.1.1 Site Context

Fragmentation and isolation of forest patches have long-term adverse impacts on forests and wildlife habitat values associated with isolated patches. Fragmentation reduces overall forest health and leads to a loss of biodiversity, and increases invasive plants, pests, and pathogens. Isolation at the landscape scale inhibits the movement of plants and animals over the long-term.

As discussed above, the subject parcel has been isolated for nearly a century, since the construction of Route 2 on its south and the development of dense housing to its north. There is a greenway connection to Spy Pond and the Mystic River through existing bike paths, which mitigates the effects of isolation to a certain degree, but this remains a significantly isolated and therefore compromised patch of forest.

4.1.2 Important Wildlife Habitat Features

Survey plots were established in locations where direct impact to Arlington Bylaw Adjacent Upland Resource Areas (AURAs) is proposed or immediately adjacent, and to Floodplain sites that would be directly affected by proposed work, as well as to two locations where Compensatory Storage may be proposed for the project.

Using the Wetlands Protection Act Wildlife Habitat Protection Guidance, Appendix B: Detailed Wildlife Habitat Evaluation as a basis for site evaluation, BSC Group evaluated the project site for features that provide important wildlife habitat.

- Wetland/Aquatic Food Plants were not detected in survey plots. This is a result of locating plots primarily in AURA and floodplain locations. No plots were established within the flagged wetlands. Upland Food Plants are present on the project site, found in several of the survey plots. The project will not adversely affect availability of wetland plants that are important for wildlife food, but may marginally diminish available upland wildlife food plants. Mitigation of this impact could be accomplished with careful landscape planning.
- The property is characterized by numerous large trees, many of which are near or in excess of 30" DBH. We did not conduct an inventory of such trees as part of this evaluation, but they were present at five (5) of the eight (8) survey plots. Large trees were mostly living, and there were few dead standing trees across the site, and relatively few snags or cavities, considering the extensive amount of downed woody debris.
- The most significant feature found throughout the site is the extensive amount of downed woody debris. Each survey plot was characterized by a large amount of woody debris, from very small, typically abundant fuel wood to a number of quite large downed tree trunks. This feature can be particularly valuable to small mammals, reptiles and amphibians. The project may reduce available downed woody debris within the small amount of jurisdictional resource area proposed for alteration. However, we believe that the proportion of available woody debris on the site will not be adversely affected due to its abundance at all survey plots. Mitigation of this impact could be accomplished by placing coarse woody debris in compensatory storage areas or in AURA zones and with careful consideration in landscape design and implementation.
- Rocks, rock piles, and debris were also abundant on the project site, which can all provide valuable cover objects for small mammals, reptiles and amphibians.
- There was no suitable turtle nesting habitat, nor wetlands likely to support rare species. The large wetland on site (Series C) is dominated by Phragmites, and as such not expected to provide important waterfowl habitat.
- There are no depressions that appear to provide likely vernal pool habitat on the site.

4.1.3 Invasive Species

The site is characterized by the presence of invasive exotic plant species throughout most survey plots. Garlic Mustard is especially abundant throughout the site, dominating the herbaceous layer of the forest. Garlic Mustard forms dense stands and crowds out native plants. It is also allelopathic, affecting suitability of soil to native plants. Alteration of a native flora by invasive plants is known to alter the value of forest and wetland habitats for wildlife. The abundance of Garlic Mustard, and presence of Japanese Knotweed and Oriental Bittersweet at most survey sites has a significant adverse effect on wildlife.

4.1.4 Human Encampment

Two survey plots, FP-3 and CS-2, were located directly within the human encampment located on the property and therefore not surveyed. There is no suitable habitat value to an area with extensive, on-going habitation.

It is important to note the adverse effects on wildlife habitat values in the forest and wetlands on the project site resulting from the extensive human encampment. The extensive amount of trash that is spread throughout the site has a direct effect of eliminating important wildlife habitat functions. Trash may be construed to provide shelter for some species, and may attract prey organisms, but it eliminates natural

cover, may introduce toxins to soil and water resources, and expands the footprint of human habitation which most wildlife make an effort to avoid.

The encampment on the site of the proposed project has a direct negative impact on the wildlife habitat values of the woods and wetlands.

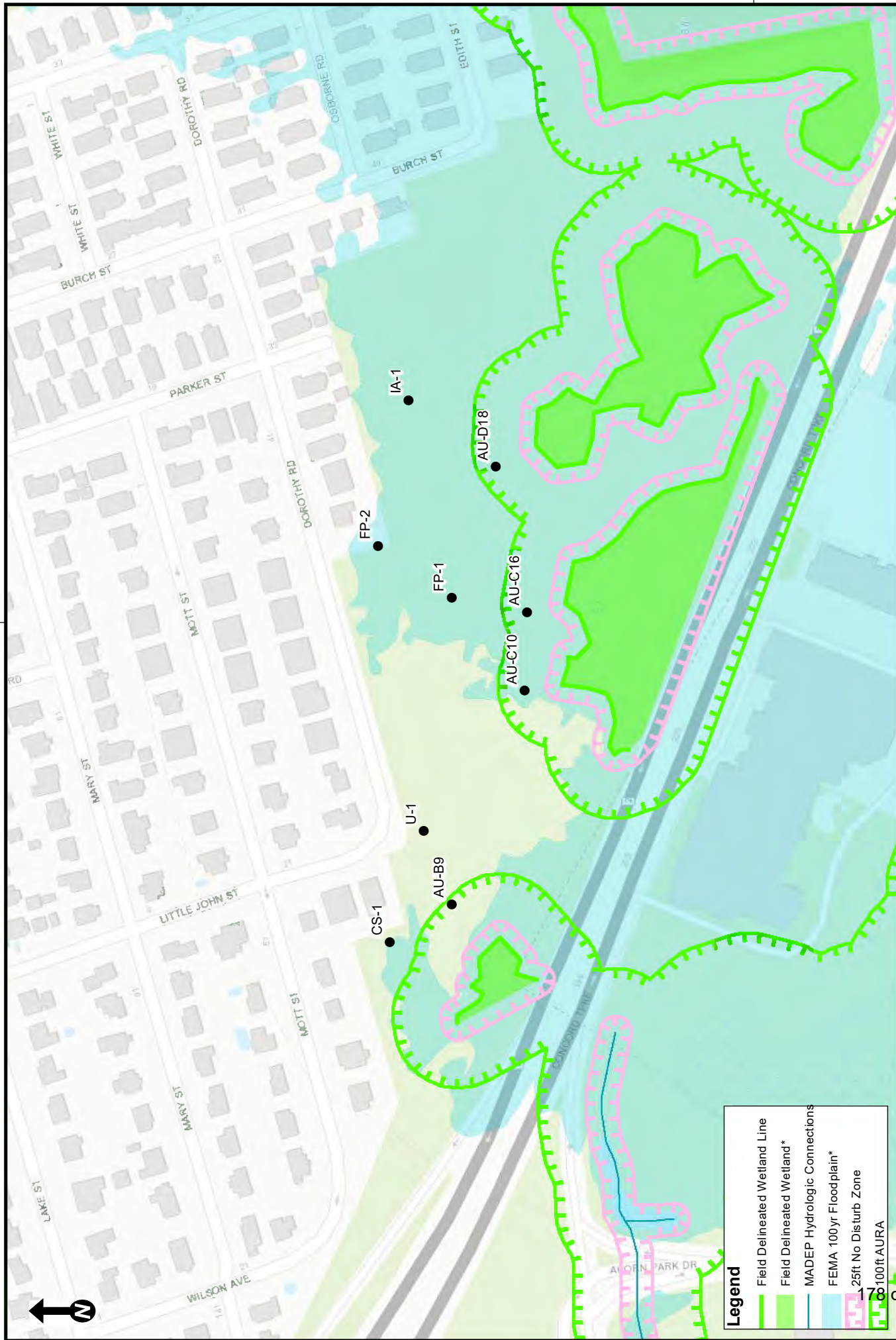
5.0 CONCLUSION

The BSC Group investigation of the Wildlife Habitat and Vegetation on the site of the proposed Thorndike Place project identified suitable resources for common wildlife species that would normally be expected in an urban/suburban forest fragment of this size. Rabbit, squirrel, and (presumed) coyote were seen, along with a variety of passerine birds. Raccoon, skunk, fox, and possibly deer, and other human-adapted or human-tolerant species are likely to occur in this patch of woods over time. Wetlands on site could also support some species of frog, and the surrounding woods might provide non-breeding habitat for these.

The site is largely isolated from surrounding natural areas which significantly reduces its wildlife habitat value. The forest's potential habitat value is further diminished by extensive invasive exotic plants throughout the site, and by the large human presence on the property.

The current revised proposed project has eliminated a significant amount of direct wetland, buffer zone, and Adjacent Upland Resource Area impacts. The project's effects on wildlife habitat values of the jurisdictional resource areas on the project site have been reduced dramatically from earlier proposals. Through careful design and implementation of flood storage mitigation areas and thoughtful, wildlife-focused landscape planning, the project should have a net beneficial outcome on the wildlife habitat values of the project site.

71°9'0"W



Legend

- Field Delineated Wetland Line
- Field Delineated Wetland*
- MADEP Hydrologic Connections
- FEMA 100yr Floodplain*
- 25ft No Disturb Zone
- 170-100ft AURA

71°9'0"W

Scale: 1 inch = 200 feet
0 110 220
Feet
(Page Size 8.5 x 11)

THORNDIKE PLACE
Arlington, MA

Source: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS,

STORMWATER REPORT

**THORNDIKE PLACE
DOROTHY ROAD
ARLINGTON, MA**

NOVEMBER 2020
REVISED: AUGUST 2021
SEPTEMBER 2023

Owner/Applicant:

ARLINGTON LAND REALTY LLC
c/o Mugar Enterprises, Inc.
116 Huntington Avenue
Boston, MA 02116

BSC Job Number: 23407.00

Prepared by:



803 Summer Street
Boston, MA 02127

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SECTION 1.0

PROJECT INFORMATION

1.01 PROJECT DESCRIPTION

Arlington Land Realty, LLC (The Applicant) is seeking to construct a new age restricted multi-family housing and assisted living development in Arlington, Massachusetts, hereinafter referred to as “the Project.” The total property area is approximately 17.66 acres and is located off Dorothy Road near the intersection with Littlejohn Street. The project is bounded on the north by Dorothy Road, on the east by residential properties and Thorndike Field, and bounded on the south and west by Concord Turnpike (Route 2).

The Project consists of clearing and grubbing of the northwest section of the property and construction of one 4-story assisted living residential building with a lower level parking garage, six duplex townhouses with covered carports, as well as surface parking, walkways, utility services, and a stormwater management system. The buildings have a combined footprint of approximately 43,100 square feet.

The Project is designed to comply with the Massachusetts General Laws (M.G.L.) Chapter 40B, which allows developers to override certain aspects of municipal zoning bylaws by providing a certain percentage of affordable housing, as well as the Department of Environmental Protection’s Stormwater Management Standards. There are wetland resource areas in the south, west and east portions of the property. The Project is concentrated in the northwest area of the property and minimizes impacts to the 100-foot wetland buffer zones. Part of the site is located within the 1% Chance Annual Flood as defined by FEMA which is regulated under the Wetlands Protection Act as Bordering Land Subject to Flooding (BLSF). Compensatory flood storage is proved at a 2:1 ratio as described in section 2.12 below.

1.02 PRE-DEVELOPMENT CONDITIONS

The existing site topography generally slopes southeast across the property towards the wetlands located on the property with slopes ranging from 0-15%. The current site is comprised of forest and the primary soil classification identified by the NRCS Web Soil Survey is udorthents (655), which accounts for the majority of the property and all of the project area. On November 25, 2020, BSC Group conducted three test pits on the site, the locations of which are noted on the Grading and Drainage plan, and the test pit logs are attached in Appendix D. The test pits consisted primarily of fill material to a depth of 9-11 feet generally conforming with the soils mapping. Even though the material was fill, all samples textured as sandy loam in test pits TP-1 and TP-2, closest to the proposed stormwater management systems. At the bottom of test pit TP-3, a layer of clay material was found. Based on the fill materials found, runoff calculations have been performed using curve numbers corresponding to Hydrologic Soil Group (HSG) C.

Due to changes to the site design over the course of the permitting process, the proposed infiltration systems were relocated. As such, and to comply with Conditions C.2(k) and I.17 of the Comprehensive Permit that was issued for the project in 2021, BSC conducted 8 additional soil test pits on May 18 and 19, 2023. The soil types for these test pits generally consisted of fill materials overlaying fine sandy loam, consistent with the previous test pits conducted in 2020. In accordance with the Comprehensive Permit conditions, BSC coordinated with the Town of Arlington to ensure that Town staff or a representative designated by the Town would be on site during test pit work to witness and confirm the results. BSC contacted Claire Ricker, Director of Planning & Community Development to coordinate a test pit witness for the Town and was referenced through Town Engineer, Wayne Chouinard to David Morgan, Environmental Planner and Conservation Agent. Mr. Morgan arranged to have a representative from Whitestone Associates on site to witness the test pits on May 18 and 19, 2023. These test pit locations have been added to the revised Grading and Drainage plan and the additional test pit logs are included in Appendix D.

The existing site being largely undeveloped has no existing drainage facilities and the majority of the stormwater runoff is directed to the wetlands on the property. A small portion of the site discharges to the north to Dorothy Road.

1.03 POST-DEVELOPMENT CONDITIONS

The proposed stormwater management system has been designed in a manner that will meet or exceed the provisions of the Department of Environmental Protection (DEP) Stormwater Management Standards for a new construction project.

Stormwater runoff from a portion of the 4-story building (approximately 18,800 square feet) will be temporarily detained on the roof of the building. This collected runoff will be released at controlled rates through roof drains to an underground infiltration system in the adjacent driveway and drop-off area. The majority of the 4-story building roof will discharge at grade directly to the surface and flow overland towards the wetlands to the south.

Stormwater runoff from the site driveway and small parking/drop-off area at the main entrance to the building will be collected via a deep sump catch basin, conveyed through a water quality unit before being directed to the underground infiltration system. Stormwater runoff from the driveway into the garage below the building will be collected via a trench drain and conveyed through a water quality unit before being directed to the underground system. Due to its elevation difference, this leg of the system has been provided with a backflow preventer device. In addition, runoff from the townhouse and carport roofs, as well as the landscaped areas between the townhouses and 4-story building will be collected and routed to the underground infiltration area. This underground infiltration system provides for recharge to groundwater and provides peak flow rate attenuation. In larger storm events, this system will overflow through an outlet control structure to a flared end section with a rip-rap apron to the south.

Stormwater runoff from the townhouse driveways along Dorothy Rd will be collected via individual trench drains and routed to small underground infiltration chamber systems beneath each driveway. Each system is designed to completely hold and infiltrate the 100-year, 24-hour storm event.

Although all soils sampled in test pits TP-1 and TP-2, as well as the 8 test pits conducted in May 2023, were identified as sandy loam (see above), the infiltration rate for loam (0.52-inches per hour) has been used in the infiltration system design to account for the materials found being primarily fill. Based upon the test pit data performed in November 2020 (see above), the estimated seasonal high groundwater elevation ranges between elevations 0 and 3. Estimated seasonal high groundwater elevations were found to be higher in some of the 2023 test pits than in the 2020 test pits. The highest groundwater elevation from the 2023 test pits of 3.98 was used for the entire site in the proposed drainage design. As such the infiltration systems have been set with a bottom elevation of 6.0 and higher to provide the minimum 2-feet of clearance above groundwater and account for any groundwater fluctuations that may occur.

To provide emergency access to the sides and rear of the building, a reinforced grass access lane will be installed. A portion of this access lane will include a 6-foot wide, porous asphalt walkway to allow residents to have ADA/AAB accessible access the rear of the site. Both the reinforced grass and porous asphalt will allow stormwater runoff to freely infiltrate back to the ground and will result in negligible runoff.

Specifics of the project's compliance with the Stormwater Standards are discussed in detail in the following sections.

SECTION 2.0

DRAINAGE SUMMARY

2.01 Stormwater Standard 1 – New Stormwater Conveyances

Per Massachusetts Stormwater Management Standard #1, no new outfalls may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. No new untreated stormwater discharges are proposed. Rip-rap outlet protection sizing calculations are included in Section 6.0 of this Report.

2.02 Stormwater Standard 2 – Stormwater Runoff Rates

Watershed modeling was performed using HydroCAD Stormwater Modeling Software version 10.20, a computer aided design program that combines SCS runoff methodology with standard hydraulic calculations. A model of the site's hydrology was developed for both pre- and post-development conditions to assess the effects of the proposed development on the project site and surrounding areas.

Stormwater runoff was modeled using data from the NOAA 14++ rainfall atlas. The following rainfall values have been used in our analysis and the NOAA 14++ data is included in Appendix D:

<u>Storm Frequency</u>	<u>NOAA 14++ Rainfall (Inches)</u>
2-year	4.02
10-year	6.40
25-year	8.30
50-year	9.67
100-year	11.50

The stormwater management system for the project has been designed such that the post-development conditions result in no increase to peak runoff rates off the property for the 2, 10, 25, 50, and 100-year, 24-hour storm events, as detailed in the table below.

Peak Flow Discharge Rates

Node 1L – Flow to Wetlands

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Post-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs)
2-Year	3.7	3.4	-0.3
10-Year	9.0	6.5	-2.5
25-Year	13.7	9.7	-4.0
50-Year	17.2	13.3	-3.9
100-Year	22.0	17.9	-4.1

Node 2L – Flow Towards Street

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Post-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs)
2-Year	0.3	0.3	0.0
10-Year	0.7	0.6	-0.1
25-Year	1.0	0.9	-0.1
50-Year	1.2	1.1	-0.1
100-Year	1.5	1.3	-0.2

Node 100L – Total Flows

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Post-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs)
2-Year	3.8	3.6	-0.2
10-Year	9.4	7.1	-2.3
25-Year	14.2	10.4	-3.8
50-Year	17.9	14.1	-3.8
100-Year	22.7	19.0	-3.7

2.03 Stormwater Standard 3 – Groundwater Recharge

Groundwater recharge is provided on site via an underground structural infiltration system beneath the surface parking area to the north of the building, and smaller systems beneath each individual driveway of the duplex townhouses. Overall, the project will result in no loss of annual recharge to groundwater as required by Standard 3. Refer to Section 6.0 of this Report for groundwater recharge information.

As the infiltration system has more than 2-feet but less than 4-feet separation to estimated seasonal high groundwater, a mounding analysis has been performed in accordance with the Hantoush Method to ensure that a groundwater mound

does not extend into the bottom of the infiltration system preventing infiltration of the required recharge volume. This analysis is included in Section 6.0 of this Report.

2.04 Stormwater Standard 4 – TSS Removal

As a new development, the Project stormwater management system will achieve a TSS removal greater than 80%. The proposed stormwater management system has been designed to provide treatment of runoff in order to reduce suspended solids prior to discharge off-site through the implementation of the following best management practices:

- Deep Sump Hooded Catch Basins
- Proprietary Hydrodynamic Separators
- Underground Stormwater Infiltration Systems

The water quality volume is defined as the runoff volume requiring TSS Removal for the site and is equal to 0.5-inches of runoff over the total impervious area of the post-development site. The required water quality volume for the project is provided in Section 6.0 of this Report.

The underground infiltration system has been sized to treat the required water quality volume and calculations are included in Section 6.0 of this Report.

A long-term pollution prevention plan complying with the requirements of Standard 4 is included in Section 4.0 of this Report.

2.05 Stormwater Standard 5 – Land Uses with Higher Potential Pollutant Loads

This standard is not applicable as the project site is not a land use with higher potential pollutant loads (LUHPPL).

2.06 Stormwater Standard 6 – Stormwater Discharges to a Critical Area

This standard is not applicable as runoff from the project site does not discharge to a critical area.

2.07 Stormwater Standard 7 – Redevelopment Projects

This project is a new development and therefore has been designed to fully comply with the Stormwater Management Standards.

2.08 Stormwater Standard 8 – Sedimentation and Erosion Control Plan

Erosion and sedimentation controls are shown on the Project Plans. Additionally, a Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in Section 3.0 of this Report.

2.09 Stormwater Standard 9 – Long Term Operation and Maintenance Plan

A Long-Term Operation and Maintenance Plan is included in Section 4.0 of this Report.

2.10 Stormwater Standard 10 – Illicit Discharges

There are no known illicit discharges on the project site, and none are proposed. An illicit discharge compliance statement is included in Section 6.0 and will be signed by the Applicant prior to issuance of any permits.

2.11 Conclusion

The project has been designed in accordance with DEP Stormwater Management Standards. Through the construction of the aforementioned stormwater systems, the project will provide peak rate attenuation, TSS removal and groundwater recharge.

2.12 Compensatory Flood Storage

A portion of the project site is located within the 1% Chance Annual Flood as defined by FEMA, which is regulated under the Wetlands Protection Act as Bordering Land Subject to Flooding (BLSF). In order to protect the values provided by BLSF and prevent downstream flooding impacts, the project is required to provide compensatory flood storage on a 1-foot incremental basis to match whatever is lost due to the project's development. In order to provide this compensatory flood storage, the project will minimize the area of BLSF impacted and regrade a portion of the project property southeast of the proposed building as shown on the Plans. This regraded area will provide compensatory flood storage at a 2 to 1 ratio for any flood storage lost. A breakdown of the flood storage impacts and compensatory storage provided is shown below:

<u>Elevations</u>	<u>Existing Incremental Available Flood Storage (CU.FT.)</u>	<u>Incremental Available Flood Storage with No Compensatory Storage (CU.FT.)</u>	<u>Incremental Flood Storage Change w/No Compensatory Storage (CU.FT.)</u>	<u>Proposed Incremental Compensatory Storage (CU.FT.)</u>	<u>Ratio of Compensatory Storage to Storage Lost</u>
5.0 - 6.0	136.0	67.5	-68.5	146.0	2.1
6.0 - 6.8	9,327.6	5,003.2	-4,324.4	9,014.8	2.1

As shown above, the project will exceed the 2 to 1 ratio of compensatory flood storage for all flood storage lost due to the project development. In addition, as shown on the Plans, the proposed compensatory storage is hydrologically connected to the flood plain impacted by the project. Therefore, the project as proposed meets the applicable requirements for BLSF in the Wetlands Protection Act.

SECTION 3.0

CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

3.0 CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

This Section specifies requirements and suggestions for implementation of a Stormwater Pollution Prevention Plan (SWPPP) for **Thorndike Place, in Arlington, Massachusetts**. The SWPPP shall be provided and maintained on-site by the Contractor(s) during all construction activities. The SWPPP shall be updated as required to reflect changes to construction activity.

The stormwater pollution prevention measures contained in the SWPPP shall be at least the minimum required by Local Regulations. The Contractor shall provide additional measures to prevent pollution from stormwater discharges in compliance with the National Pollution Discharge Elimination System (NPDES) Phase II permit requirements and all other local, state and federal requirements.

The SWPPP shall include provisions for, but not be limited to, the following:

1. Construction Trailers
2. Lay-down Areas
3. Equipment Storage Areas
4. Stockpile Areas
5. Disturbed Areas

The Contractor shall NOT begin construction without submitting evidence that a NPDES Notice of Intent (NOI) governing the discharge of stormwater from the construction site for the entire construction period has been filed **at least fourteen (14) days prior to construction**. It is the Contractor's responsibility to complete and file the NOI, unless otherwise determined by the project team.

The cost of any fines, construction delays and remedial actions resulting from the Contractor's failure to comply with all provisions of local regulations and Federal NPDES permit requirements shall be paid for by the Contractor at no additional cost to the Owner.

As a requirement of the EPA's NPDES permitting program, each Contractor and Subcontractor responsible for implementing and maintaining stormwater Best Management Practices shall execute a Contractor's Certification form.

Erosion and Sedimentation Control

The Contractor shall be solely responsible for erosion and sedimentation control at the site. The Contractor shall utilize a system of operations and all necessary erosion and sedimentation control measures, even if not specified herein or elsewhere, to minimize erosion damage at the site to prevent the migration of sediment into environmentally sensitive areas. Environmentally sensitive areas include all wetland resource areas within, and downstream of, the site, and those areas of the site that are not being altered.

Erosion and sedimentation control shall be in accordance with this Section, the design drawings, and the following:

- ❑ "National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities (EPA Construction General Permit February 16, 2017).
- ❑ Massachusetts Stormwater Management Policy Handbook issued by the Massachusetts Department of Environmental Protection, January 2008.
- ❑ Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, A Guide for Planners, Designers and Municipal Officials, March 1997.

The BMP's presented herein should be used as a guide for erosion and sedimentation control and are not intended to be considered specifications for construction. The most important BMP is maintaining a rapid

construction process, resulting in prompt stabilization of surfaces, thereby reducing erosion potential. Given the primacy of rapid construction, these guidelines have been designed to allow construction to progress with essentially no hindrance by the erosion control methods prescribed. These guidelines have also been designed with sufficient flexibility to allow the Contractor to modify the suggested methods as required to suit seasonal, atmospheric, and site-specific physical constraints.

Another important BMP is the prevention of concentrated water flow. Sheet flow does not have the erosive potential of a concentrated rivulet. These guidelines recommend construction methods that allow localized erosion control and a system of construction, which inhibits the development of shallow concentrated flow. These BMP's shall be maintained throughout the construction process.

CONTACT INFORMATION AND RESPONSIBLE PARTIES

The following is a list of all project-associated parties:

Owner

Arlington Land Realty, LLC
c/o Mugar Enterprises, Inc.
116 Huntington Avenue
Boston, MA 02116

Contractor

To be determined

Environmental Consultant

BSC Group, Inc.
803 Summer Street
Boston, MA 02127

Contact: Dominic Rinaldi, P.E.
Phone: (617) 896-4300
Email: drinaldi@bscgroup.com

Qualified SWPPP Inspectors

To Be Determined

3.1 Procedural Conditions of the Construction General Permit (CGP)

The following list outlines the Stormwater Responsibilities for all construction operators working on the Project. The operators below agree through a cooperative agreement to abide by the following conditions throughout the duration of the construction project, effective the date of signature of the required SWPPP. These conditions apply to all operators on the project site.

The project is subject to EPA's NPDES General Permit through the CGP. The goal of this permit is to prevent the discharge of pollutants associated with construction activity from entering the existing and proposed storm drain system or surface waters.

All contractors/operators involved in clearing, grading and excavation construction activities must sign the appropriate certification statement required, which will remain with the SWPPP. The owner must also sign

a certification, which is to remain with the SWPPP in accordance with the signatory requirements of the SWPPP.

Once the SWPPP is finalized, a signed copy, plus supporting documents, must be held at the project site during construction. A copy must remain available to EPA, State and Local agencies, and other interested parties during normal business hours.

The following items associated with this SWPPP must be posted in a prominent place at the construction site until final stabilization has been achieved:

- The completed/submitted NOI form
- Location where the public can view the SWPPP during normal business hours
- A copy of the signed/submitted NOI, permit number issued by the EPA and a copy of the current CGP.

Project specific SWPPP documents are not submitted to the US EPA unless the agency specifically requests a copy for review. SWPPP documents requested by a permitting authority, the permittee(s) will submit it in a timely manner.

EPA inspectors will be allowed free and unrestricted access to the project site and all related documentation and records kept under the conditions of the permit.

The permittee is expected to keep all BMP's and Stormwater controls operating correctly and maintained regularly.

Any additions to the project which will significantly change the anticipated discharges of pollutants, must be reported to the EPA. The EPA should also be notified in advance of any anticipated events of noncompliance. The permittee must also orally inform the EPA of any discharge, which may endanger health or the environment within 24 hours, with a written report following within 5 days.

In maintaining the SWPPP, all records and supporting documents will be compiled together in an orderly fashion. Inspection reports and amendments to the SWPPP must remain with the document. Federal regulations require permittee(s) to keep their Project Specific SWPPP and all reports and documents for at least three (3) years after the project is complete.

3.2 Existing Site and Soil Conditions

The total project area is approximately 17.66 acres and is located off Dorothy Road. The project is bounded on the north by Dorothy Road, bounded on the east by residential properties, and bounded on the south and west by Concord Turnpike (Route 2).

The current site is comprised of forest and the primary soil classification identified by the NRCS Web Soil Survey is udorthents (655), which accounts for the majority of the property and all of the project area. On November 25, 2020, BSC Group conducted three test pits on the site, the locations of which are noted on the Grading and Drainage plan, and the test pit logs are attached in Appendix D. The test pits consisted of primarily fill material to a depth of 9-11 feet generally conforming with the soils mapping. Even though the material was fill, all samples textured as sandy loam in test pits TP-1 and TP-2, closest to the proposed stormwater management systems. At the bottom of test pit TP-3, a layer of clay material was found. On May 18 and 19, 2023, BSC Group conducted 8 additional test pits on site to determine soil conditions at the locations of each of the infiltration systems in the revised drainage design. These test pits were consistent with the 2020 test pits and generally consisted of fill material over fine sandy loam. These test pits have been added to the Grading and Drainage plan and test pit logs are attached in Appendix D as well. Based

on the fill materials found, runoff calculations have been performed using curve numbers corresponding to Hydrologic Soil Group (HSG) C.

3.3 Project Description and Intended Construction Sequence

The site is currently comprised of woods. The proposed activities will include the following major components:

- The construction of one (1) multi-family housing building and six (6) duplex townhouses with associated parking, driveways, walkways, and retaining walls,
- The construction of stormwater management systems,
- Site grading and compensatory flood storage creation, and
- Utility connections and installation.

The proposed project will disturb a total of approximately 175,000± S.F. (4.02± acres).

Soil disturbing activities will include site demolition, installing stabilized construction exits, installation of erosion and sedimentation controls, grading, storm drain inlets, stormwater management systems, utilities, building foundation, construction of site driveways and preparation for final landscaping. Please refer to Table 1 for the projects anticipated construction timetable. A description of BMP's associated with project timetable and construction-phasing elements is provided in this Erosion and Sediment Control Plan.

Table 1 – Anticipated Construction Timetable

Construction Phasing Activity	Anticipated Timetable
Grubbing and Stripping of Limits of Construction Phase	To be determined
Rough Site Grading and Site Utilities	To be determined
Utility Plan Construction	To be determined
Landscaping	To be determined

3.4 Potential Sources of Pollution

Any project site activities that have the potential to add pollutants to runoff are subject to the requirements of the SWPPP. Listed below are a description of potential sources of pollution from both sedimentation to Stormwater runoff, and pollutants from sources other than sedimentation.

Table 2 – Potential Sources of Sediment to Stormwater Runoff

Potential Source	Activities/Comments
Construction Site Entrance and Site Vehicles	Vehicles leaving the site can track soils onto public roadways. Site Vehicles can readily transport exposed soils throughout the site and off-site areas.
Grading Operations	Exposed soils have the potential for erosion and discharge of sediment to off-site areas.
Material Excavation, Relocation, and Stockpiling	Stockpiling of materials during excavation and relocation of soils can contribute to erosion and sedimentation. In addition, fugitive dust from stockpiled material, vehicle transport and site grading can be deposited in wetlands and waterway.
Landscaping Operations	Landscaping operations specifically associated with exposed soils can contribute to erosion and sedimentation. Hydroseeding, if not properly applied, can runoff to adjacent wetlands and waterways.

Table 3 – Potential Pollutants and Sources, other than Sediment to Stormwater Runoff

Potential Source	Activities/Comments
Staging Areas and Construction Vehicles	Vehicle refueling, minor equipment maintenance, sanitary facilities and hazardous waste storage
Materials Storage Area	General building materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc.
Construction Activities	Construction, paving, curb/gutter installation, concrete pouring/mortar/stucco

3.5 Erosion and Sedimentation Control Best Management Practices

All construction activities will implement Best Management Practices (BMP's) in order to minimize overall site disturbance and impacts to the sites natural features. Please refer to the following sections for a detailed description of site specific BMP's. In addition, an Erosion and Sedimentation Control Plan is provided in the Site Plans.

3.6 Timetable and Construction Phasing

This section provides the Owner and Contractor with a suggested order of construction that shall minimize erosion and the transport of sediments. The individual objectives of the construction techniques described herein shall be considered an integral component of the project design intent of each project phase. The construction sequence is not intended to prescribe definitive construction methods and should not be interpreted as a construction specification document. However, the Contractor shall follow the general construction phase principles provided below:

- Protect and maintain existing vegetation wherever possible.
- Minimize the area of disturbance.
- To the extent possible, route unpolluted flows around disturbed areas.
- Install mitigation devices as early as possible.
- Minimize the time disturbed areas are left unstabilized.
- Maintain siltation control devices in proper condition.
- The contractor should use the suggested sequence and techniques as a general guide and modify the suggested methods and procedures as required to best suit seasonal, atmospheric, and site

specific physical constraints for the purpose of minimizing the environmental impact of construction.

Demolition, Grubbing and Stripping of Limits of Construction Phase

- Install Temporary Erosion Control (TEC) devices as required to prevent sediment transport into resource areas.
- Place a ring of silt socks and/or haybales around stockpiles.
- Stabilize all exposed surfaces that will not be under immediate construction.
- Store and/or dispose all pavement and building demolition debris as indicated in accordance with all applicable local, state, and federal regulations.

Driveway Area Sub-Base Construction

- Install temporary culverts and diversion ditches and additional TEC devices as required by individual construction area constraints to direct potential runoff toward detention areas designated for the current construction phase.
- Compact gravel as work progresses to control erosion potential.
- Apply water to control air suspension of dust.
- Avoid creating an erosive condition due to over-watering.
- Install piped utility systems as required as work progresses, keeping all inlets sealed until all downstream drainage system components are functional.

Binder Construction

- Fine grade gravel base and install processed gravel to the design grades.
- Compact pavement base as work progresses.
- Install pavement binder coat starting from the downhill end of the site and work toward the top.

Finish Paving

- Repair and stabilize damaged side slopes.
- Clean inverts of drainage structures.
- Install final top coat of pavement.

Final Clean-up

- Clean inverts of culverts and catch basins.
- Remove sediment and debris from rip-rap outlet areas.
- Remove TEC devices only after permanent vegetation and erosion control has been fully established.

3.7 Site Stabilization

Grubbing Stripping and Grading

- Erosion control devices shall be in place as shown on the design plans before grading commences.
- Stripping shall be done in a manner, which will not concentrate runoff. If precipitation is expected, earthen berms shall be constructed around the area being stripped, with a silt sock, silt fence or haybale dike situated in an arc at the low point of the berm.
- If intense precipitation is anticipated, silt socks, haybales, dikes and /or silt fences shall be used as required to prevent erosion and sediment transport. The materials required shall be stored on site at all time.

- If water is required for soil compaction, it shall be added in a uniform manner that does not allow excess water to flow off the area being compacted.
- Dust shall be held at a minimum by sprinkling exposed soil with an appropriate amount of water.

Maintenance of Disturbed Surfaces

- Runoff shall be diverted from disturbed side slopes in both cut and fill.
- Mulching may be used for temporary stabilization.
- Silt sock, haybale or silt fences shall be set where required to trap products of erosion and shall be maintained on a continuing basis during the construction process.

Loaming and Seeding

- Loam shall not be placed unless it is to be seeded directly thereafter.
- All disturbed areas shall have a minimum of 4" of loam placed before seeded and mulched.
- Consideration shall be given to hydro-mulching, especially on slopes in excess of 3 to 1.
- Loamed and seeded slopes shall be protected from washout by mulching or other acceptable slope protection until vegetation begins to grow.

Stormwater Collection System Installation

- The Stormwater drainage system shall be installed from the downstream end up and in a manner which will not allow runoff from disturbed areas to enter pipes.
- Excavation for the drainage system shall not be left open when rainfall is expected overnight. If left open under other circumstances, pipe ends shall be closed by a staked board or by an equivalent method.
- All catch basin openings shall be covered by a silt bag between the grate and the frame or protected from sediment by silt fence surrounding the catch basin grate.

Completion of Paved Areas

- During the placement of sub-base and pavement, the entrance to the Stormwater drainage systems shall be sealed when rain is expected. When these entrances are closed, consideration must be given to the direction of run-off and measures shall be undertaken to minimize erosion and to provide for the collection of sediment.
- In some situations, it may be necessary to keep catch basins open.
- Appropriate arrangements shall be made downstream to remove all sediment deposition.

Stabilization of Surfaces

- Stabilization of surfaces includes the placement of pavement, rip-rap, wood bark mulch and the establishment of vegetated surfaces.
- Upon completion of construction, all surfaces shall be stabilized even though it is apparent that future construction efforts will cause their disturbance.
- Vegetated cover shall be established during the proper growing season and shall be enhanced by soil adjustment for proper pH, nutrients and moisture content.
- Surfaces that are disturbed by erosion processes or vandalism shall be stabilized as soon as possible.
- Areas where construction activities have permanently or temporarily ceased shall be stabilized within 14 days from the last construction activity, except when construction activity will resume within 21 days (e.g., the total time period that construction activity is temporarily ceased is less than 21 days).
- Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season.

- Hay mulch is an effective method of temporarily stabilizing surfaces, but only if it is properly secured by branches, weighted snow fences or weighted chicken wire.

3.8 Temporary Structural Erosion Control Measures

Temporary erosion control measures serve to minimize construction-associated impacts to wetland resource and undisturbed areas. Please refer to the following sections for a description of temporary erosion control measures implemented as part of the project and this sample SWPPP.

3.8.1 Silt Socks, Haybales, and Silt Fencing

The siltation barriers will demarcate the limit of work, form a work envelope and provide additional assurance that construction equipment will not enter the adjacent wetlands or undisturbed portions of the site. All barriers will remain in place until disturbed areas are stabilized.

3.8.2 Temporary Stormwater Diversion Swale

A temporary diversion swale is an effective practice for temporarily diverting stormwater flows and to reduce stormwater runoff velocities during storm events. The swale channel can be installed before infrastructure construction begins at the site, or as needed throughout the construction process. The diversion swale should be routinely compacted or seeded to minimize the amount of exposed soil.

3.8.3 Dewatering Basins

Dewatering may be required during stormwater system, foundation construction and utility installation. Should the need for dewatering arise, groundwater will be pumped directly into a temporary settling basin, which will act as a sediment trap during construction. All temporary settling basins will be located within close proximity of daily work activities. Prior to discharge, all groundwater will be treated by means of the settling basin or acceptable substitute. Discharges from sediment basins will be free of visible floating, suspended and settleable solids that would impair the functions of a wetland or degrade the chemical composition of the wetland resource area receiving ground or surface water flows and will be to the combined system.

3.8.4 Material Stockpiling Locations

Piping and trench excavate associated with the subsurface utility work will be contained with a single row of silt socks and/or haybales.

3.9 Permanent Structural Erosion Control Measures

Permanent erosion control measures serve to minimize post-construction impacts to wetland resource areas and undisturbed areas. Please refer to the Site Plans and Long-Term Operations and Maintenance Plan for a description of permanent erosion control measures implemented as part of the project and this SWPPP.

3.10 Good Housekeeping Best Management Practices

3.10.1 Street Sweeping

Dorothy Road in front of the project property shall be swept clean on a daily basis of any soils tracked onto it from the project site. All sweepings shall be disposed of off-site in accordance with all applicable laws and regulations.

3.10.2 Material Handling and Waste Management

Solid waste generation during the construction period will be primarily construction debris. The debris will include scrap lumber (used forming and shoring pallets and other shipping containers), waste packaging materials (plastic sheeting and cardboard), scrap cable and wire, roll-off containers (or dumpsters) and will be removed by a contract hauler to a properly licensed landfill. The roll-off containers will be covered with

a properly secured tarp before the hauler exits the site. In addition to construction debris, the construction work force will generate some amount of household-type wastes (food packing, soft drink containers, and other paper). Trash containers for these wastes will be located around the site and will be emptied regularly so as to prevent wind-blown litter. This waste will also be removed by a contract hauler.

All hazardous waste material such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed shipping containers in the hazardous-materials storage area and segregated from other non-waste materials. Secondary containment will be provided for all materials in the hazardous materials storage area and will consist of commercially available spill pallets. Additionally, all hazardous materials will be disposed of in accordance with federal, state and municipal regulations.

Two temporary sanitary facilities (portable toilets) will be provided at the site in the combined staging area. The toilets will be away from a concentrated flow path and traffic flow and will have collection pans underneath as secondary treatment. All sanitary waste will be collected from an approved party at a minimum of three times per week.

3.10.3 Building Material Staging Areas

Construction equipment and maintenance materials will be stored at the combined staging area and materials storage areas. Silt fence will be installed around the perimeter to designate the staging and materials storage area. A watertight shipping container will be used to store hand tools, small parts and other construction materials.

Non-hazardous building materials such as packaging material (wood, plastic and glass) and construction scrap material (brick, wood, steel, metal scraps, and pine cuttings) will be stored in a separate covered storage facility adjacent to other stored materials. All hazardous-waste materials such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed containers under cover within the hazardous materials storage area.

Large items such as framing materials and stockpiled lumber will be stored in the open storage area. Such materials will be elevated on wood blocks to minimize contact with runoff.

The combined storage areas are expected to remain clean, well-organized and equipped with ample cleaning supplies as appropriate for the materials being stored. Perimeter controls such as containment structures, covers and liners will be repaired or replaced as necessary to maintain proper function.

3.10.4 Designated Washout Areas

Designated temporary, below-ground concrete washout areas will be constructed, as required, to minimize the pollution potential associated with concrete, paint, stucco, mixers etc. Signs will, if required, be posted marking the location of the washout area to ensure that concrete equipment operators use the proper facility. Concrete pours will not be conducted during or before an anticipated precipitation event. All excess concrete and concrete washout slurries from the concrete mixer trucks and chutes will be discharged to the washout area or hauled off-site for disposal.

3.10.5 Equipment/Vehicle Maintenance and Fueling Areas

Several types of vehicles and equipment will be used on-site throughout the project including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes and forklifts. All major equipment/vehicle fueling and maintenance will be performed off-site. A small, 20-gallon pickup bed fuel tank will be kept on-site in the combined staging area. When vehicle fueling must occur on-site, the fueling activity will occur in the staging area. Only minor equipment maintenance will occur on-site. Vehicular refueling or maintenance shall not be allowed within the Adjacent Upland Resource Area (AURA) or in any protected wetland resource areas as defined by the Town of Arlington Regulations for

Wetland Protection. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area. Drip pans will be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.

3.10.6 Equipment/Vehicle Wash down Area

All equipment and vehicle washing will be performed off-site.

3.10.7 Spill Prevention Plan

A spill containment kit will be kept on-site in the Contractor's trailer and/or the designated staging area throughout the duration of construction. Should there be an accidental release of petroleum product into a resource area, the appropriate agencies will be immediately notified.

3.10.8 Inspections

Maintenance of existing and proposed BMP's to address stormwater management facilities during construction is an on-going process. The purpose of the inspections is to observe all sources of stormwater or non-stormwater discharge as identified in the SWPPP as well as the status of the receiving waters and fulfill the requirements of the Order of Conditions. The following sections describe the appropriate inspection measures to adequately implement the project's SWPPP. A blank inspection form is provided at the end of this section. Completed inspection forms are to be maintained on site.

Inspection Personnel

The owner's appointed representative will be responsible for performing regular inspections of erosion controls and ordering repairs as necessary.

Inspection Frequency

Inspections will be performed by qualified personnel once every 7 days, in accordance with the CGP. The inspections must be documented on the inspection form provided at the end of this section, and completed forms will be provided to the on-site supervisor and maintained at the Owner's office throughout the entire duration of construction.

Inspection Reporting

Each inspection report will summarize the scope of the inspection, name(s) and qualifications of personnel making the inspection, and major observations relating to the implementation of the SWPPP, including compliance and non-compliance items. Completed inspection reports will remain with the completed SWPPP on site.

3.10.9 Amendment Requirements

The final SWPPP is intended to be a working document that is utilized regularly on the construction site, and provides guidance to the Contractor. It must reflect changes made to the originally proposed plan and will be updated to include project specific activities and ensure that they are in compliance with the NPDES General Permit and state and local laws and regulations. It should be amended whenever there is a change in design, construction, operation or maintenance that affects discharge of pollutants. The following items should be addressed should an amendment to the SWPPP occur:

- Dates of certain construction activities such as major grading activities, clearing and initiation of and completion of stabilization measures should be recorded.
- Future amendments to the SWPPP will be recorded as required. As this SWPPP is amended, all amendments will be kept on site and made part of the SWPPP.

- Upon completion of site stabilization (completed as designed and/or 70% background vegetative cover), it can be documented and marked on the plans. Inspections are no longer required at this time.
- Inspections often identify areas not included in the original SWPPP, which will require the SWPPP to be amended. These updates should be made within seven days of being recognized by the inspector.

3.11 SWPPP Inspection and Maintenance Report

The following form is an example to be used for SWPPP Inspection Reporting.

Stormwater Construction Site Inspection and Maintenance Report

TO BE COMPLETED AT LEAST EVERY 7 DAYS. AFTER SITE STABILIZATION, TO BE COMPLETED AT LEAST ONCE PER MONTH FOR THREE YEARS OR UNTIL A NOTICE OF TERMINATION IS FILED (IF APPLICABLE).

General Information			
Project Name	Thorndike Place		
NPDES Tracking No. (if applicable)		Location	Dorothy Road Arlington, MA
Date of Inspection		Start/End Time	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: <input type="checkbox"/> Regular <input type="checkbox"/> Pre-storm event <input type="checkbox"/> During storm event <input type="checkbox"/> Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, provide: Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? <input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Fog <input type="checkbox"/> Snowing <input type="checkbox"/> High Winds <input type="checkbox"/> Other: Temperature:			
Have any discharges occurred since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:			
Are there any discharges at the time of inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:			

Site-specific BMPs

- Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.
- Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
1	Catch Basin Protection	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
2	Haybale & Silt Fencing	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Straw Wattles	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Construction Entrance	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Sediment Basins	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6	Dewatering Pit	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Are perimeter controls and sediment barriers adequately installed	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
	(keyed into substrate) and maintained?			
4	Are discharge points and receiving waters free of any sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6	Is the construction exit preventing sediment from being tracked into the street?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	Vehicle Maintenance not allowed on site
10	Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12	(Other)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Print name and title: _____
(Qualified Person Performing the Inspection)

Signature: _____ **Date:** _____

Print name and title: _____
(Contractor/Operator)

Signature: _____ **Date:** _____

SECTION 4.0

LONG-TERM POLLUTION PREVENTION & OPERATION AND MAINTENANCE PLAN

4.0 LONG-TERM POLLUTION PREVENTION & OPERATION AND MAINTENANCE PLAN

As required by Standard #4 of the Stormwater Management Policy, this Long-Term Pollution Prevention Plan has been developed for source control and pollution prevention at the site after construction.

MAINTENANCE RESPONSIBILITY

Ensuring that the provisions of the Long-Term Pollution Prevention Plan are followed will be the responsibility of The Applicant, Arlington Land Realty, LLC.

GOOD HOUSEKEEPING PRACTICES

The site to be kept clean of trash and debris at all times. Trash, junk, etc. is not to be left outside.

VEHICLE WASHING CONTROLS

The following BMP's, or equivalent measures, methods or practices are required if you are engaged in vehicle washing and/or steam cleaning:

It is allowable to rinse down the body or a vehicle, including the bed of a truck, with just water without doing any wash water control BMP's.

If you wash (with mild detergents) on an area that infiltrates water, such as gravel, grass, or loose soil, it is acceptable to let the wash water infiltrate as long as you only wash the body of vehicles.

However, if you wash on a paved area and use detergents or other cleansers, or if you wash/rinse the engine compartment or the underside of vehicles, you must take the vehicles to a commercial vehicle wash.

REQUIREMENTS FOR ROUTINE INSPECTIONS AND MAINTENANCE OF STORMWATER BMPs

All stormwater BMPs are to be inspected and maintain as follows;

Haybales, Silt Fence, and other temporary measures

The temporary erosion control measures will be installed up gradient of any wetland resource area where any disturbance or alteration might otherwise allow for erosion or sedimentation. They will be regularly inspected to ensure that they are functioning adequately. Additional supplies of these temporary measures will be stockpiled on site for any immediate needs or routine replacement.

Deep Sump Hooded Catch Basins

Regular maintenance is essential. Catch basins remain effective at removing pollutants only if they are cleaned out frequently. Inspect or clean basins at least four times per year and at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or whenever the depth of the deposits in the catch basin sump is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.

Water Quality Treatment Units

The water quality treatment structures require periodic inspection and cleaning to maintain operation and function. Owners should have these units inspected on a semi-annual basis and after periods of intense precipitation. Inspections can be done by using a clear Plexiglas tube ("sludge judge") to extract a water column sample. When sediment accumulation reaches 15% of storage capacity, cleaning of the unit is required.

These water quality structures must and will be checked and cleaned immediately after petroleum spills; contact appropriate regulatory agencies.

Maintenance of these units should be done by a vacuum truck that will remove the water, sediment, debris, floating hydrocarbons and other materials in unit. Proper cleaning and disposal of the removed materials and liquid must be followed.

Underground Infiltration System

Maintenance is required for the proper operation of the underground infiltration system. Infiltration systems are prone to failure due to clogging if the upstream water quality units are not maintained. The use of pretreatment BMPs will minimize failure and maintenance requirements.

After construction, the infiltration system shall be inspected after every major storm for the first few months to ensure proper stabilization and function. Water levels in the access ports shall be recorded over several days to check the drainage of the systems. It is recommended that a log book be maintained showing the depth of water in the detention/infiltration systems at each observation in order to determine the rate at which the system dewater after runoff producing storm events. Once the performance characteristics of the detention/infiltration have been verified, the monitoring schedule can be reduced to an annual basis, unless the performance data suggests that a more frequent schedule is required.

Preventive maintenance on the infiltration system shall be performed at least twice a year, and sediment shall be removed from any and all pretreatment and collection structures. Sediment shall be removed when deposits approach within six inches of the invert heights of connecting pipes between unit rows, or in sumped inlet structures. Pondered water inside the systems (as visible from the access ports) that remains after several days most likely indicates that the bottom of the system is clogged and will require cleaning or replacement.

The system is designed with a defined top portal area at the “down-flow” end of the chamber that can be cut out to accept up to a 10-inch diameter riser pipe. The 10-inch riser can be used as an observation well and as access for a vacuum truck tube for use in removing sediment. The “down flow” ends of the units have end walls that are closed on the bottom. The closed bottom functions like a coffer dam, with most of the sediment depositing prior to flowing into the next chamber, facilitating its removal through the riser pipe, which is positioned directly above this area.

Pipe Outlet Protection

The outlet protection should be checked at least annually and after every major storm. If the rip-rap has been displaced, undermined or damaged, it should be repaired immediately. The channel immediately below the outlet should be checked to see that erosion is not occurring. The downstream channel should be kept clear of obstructions such as fallen trees, debris, and sediment that could change flow patterns and/or tailwater depths on the pipes. Repairs must be carried out immediately to avoid additional damage to the outlet protection apron.

PROVISIONS FOR MAINTENANCE OF LAWNS, GARDENS AND OTHER LANDSCAPE AREAS

Suggested Maintenance Operations

A. Trees and Shrubs

Disease and Pest Management - Prevention of disease or infestation is the first step of Pest Management. A plant that is in overall good health is far less susceptible to disease. Good general landscape maintenance can reduce problems from disease.

Inspections of plant materials for signs of disease or infestation are to be performed monthly by the Landscape Maintenance Contractor’s Certified Arborist. This is a critical step for early diagnosis. Trees and Shrubs that have been diagnosed to have a plant disease or an infestation of insect pests are to be treated promptly with an appropriate material by a licensed applicator.

Fertilization - Trees and shrubs live outside their natural environment and should be given proper care to maintain health and vigor. Fertilizing trees and shrubs provides the plants with nutrients needed to resist insect attack, to resist drought and to grow thicker foliage. Fertilizing of new and old trees may be done in one of three ways, in either the early spring or the late fall.

- Systemic Injection of new and existing trees on trees 2 inches or greater in diameter. You must be licensed to apply this method.

- **Soil Injection** – a liquid fertilizer with a product such as Arbor Green or Rapid Grow injected into the soil under the drip zone of a tree or shrub. Material must be used according to manufacturers' specifications to be effective. Outside contracting is recommended.
- **Punch Bar Method** – a dry fertilizer such as 10-10-10, may be used by punched holes in the drip zone of the tree 12-18" deep, two feet apart around the circumference, to the edge of the drip line. Three pounds of fertilizer should be used per diameter inch for trees with trunks six inches or more in diameter.
- **Fertilizer of shrubs** – use a fertilizer such as 10-10-10, broadcast over the planting area according to the manufacturers' rate and water in.
- All fertilization must be noted on daily maintenance log.

Watering - Trees and Shrubs will need supplemental watering to remain in vigorous health. All new plants need to be watered once a week in cool weather, twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought. Trees and shrubs should be watered in such a manner as to totally saturate the soil in the root zone area. Over-watering or constant saturation of the soil must be avoided as this could lead to root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

Plant Replacement - Unhealthy plants that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the daily maintenance log. The area shall be treated to prevent further infestation. The plant shall then be replaced with a healthy specimen of the same species and size. This work shall have a pre-established budget allowance for the year.

A spring inspection of all plant materials shall be performed to identify those plant materials that are not in vigorously healthy condition. Unhealthy plant materials shall be evaluated. If the problem is determined to be minor the plant material shall be given appropriate restorative care in accordance with this maintenance guideline until it is restored to a vigorously healthy condition. Unhealthy plant materials that do not respond to restorative care or are determined to be beyond saving shall be replaced with a healthy specimen of the same species and size. In the case of the necessity of replacing extremely large plant materials the Landscape Architect shall determine the size of the replacement plant.

Pruning - Proper pruning is the selective removal of branches without changing the plant's natural appearance, or habit of growth. All tree pruning is to be performed by a licensed Arborist. All branches that are dead, broken, scared or crossing should be removed. All cuts should be made at the collar and not cut flush with the base.

Pruning on the site shall be done for the following purposes;

- To maintain or reduce the size of a tree or shrub
- To remove dead, diseased or damaged branches
- To rejuvenate old shrubs and encourage new growth
- To stimulate future flower and fruit development
- To maximize the visibility of twig color
- To prevent damage and reduce hazards to people and properties

All shrubs are recommended to be pruned on an annual basis to prevent the shrub from becoming overgrown and eliminate the need for drastic pruning. There are several types of pruning for deciduous shrubs. Hand snips should be used to maintain a more natural look or hand shears can be used for a more formal appearance.

Winter Protection - All trees and shrubs are to be watered, fertilized, and mulched before the first frost. All stakes should be checked and ties adjusted. Damaged branches should be pruned.

Broadleaf and Coniferous Evergreen plant materials are to be sprayed with an anti-desiccant product to prevent winter burn. The application shall be repeated during a suitable mid-winter thaw.

Shrubs located in areas likely to be piled with snow during snow removal (but not designated as Snow Storage Areas) shall be marked by six-foot high poles with bright green banner flags. Stockpiles of snow are not to be located in these areas due to potential damage to the plant materials from both the weight of the snow and the snow melting chemicals.

At the fall landscape maintenance conference parameters will be discussed between the Landscape Maintenance Contractor and the snow removal contractor to assure minimal damage and loss of landscape amenities during the winter season.

Seasonal Clean Up - A thorough spring cleanup is to be performed. This includes the removal and replacement of dead or unhealthy plant materials and the cleanup of plant debris and any general debris that has accumulated over the winter season. Mulch is to be lightly raked to clean debris from the surface without removing any mulch. Twigs and debris are to be removed from the planting beds throughout the growing season.

Mulching - Planting beds shall be mulched with a treated shredded hardwood mulch free from dirt, debris, and insects. A sample of this mulch shall be given to the Owner for approval prior to installation.

Maintain a 2-3" maximum depth and keep free of weeds either by hand weeding or by the use of a pre-emergent weed control such as Treflan or Serfian. Seasonal re-mulching shall occur as necessary in the spring and the fall to maintain this minimum depth. When new mulch is added to the planting bed it shall be spread to create a total depth of no more than three inches. Edges should be maintained in a cleanly edged fashion.

Mulch shall not be placed directly against the trunk of any tree or shrub.

B. *Groundcover and Perennials*

Disease and Pest Management – Pesticides and herbicides should be applied only as problems occur, with the proper chemical applied only by a trained professional or in the case of pesticide, a Certified Pesticide Applicator. Plants should be monitored weekly and treated accordingly.

Fertilizer – The health of the plants can be maintained or improved, and their growth encouraged by an application of complete fertilizer. Apply a fertilizer such as 4-12-4 as growth becomes apparent and before mulching. Apply to all groundcover and perennial planting areas by hand and avoid letting the fertilizer come in contact with the foliage, or use a liquid fertilizer and apply by soaking the soil. Apply according to the manufacturers' specifications.

Fertilization shall stop at the end of July.

Water – Groundcovers and Perennials will need supplemental watering in order to become established, healthy plants. All new plants need to be watered once a week in cool weather, twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought. Until established, groundcovers and perennials should be watered in such a manner as to totally saturate the soil in the root zone area, to a depth of 6 inches. Once established, perennials shall continue to be watered as necessary to maintain them in a vigorous healthy condition. Over-watering or constant saturation of the soil must be avoided as this could lead to root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

On-site water shall be furnished by the Owner. Hose and other watering equipment shall be furnished by the Landscape Maintenance Contractor.

Replacement – Any unhealthy plant/s that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the landscape maintenance log. The area shall be treated to prevent further infestation. The plant/s shall then be replaced with healthy specimen/s of the same species and size. Old Forge shall have a pre-established budget allowance for this type of replacement, each year.

Plant material that is damaged as a result of other landscape maintenance activities, such as mowing, shall be replaced with healthy specimens of the same species and size, at no additional cost to the owner.

Deadheading – Perennials shall be checked on a weekly basis and dead-headed once flowers have faded or as necessary based on plant type and duration of flower. Spent flowers can be pinched off with the thumb and forefinger. Continue to remove all faded flowers until Fall. All associated debris shall be removed from site daily.

Staking – Upright-growing perennials need support especially when in flower. Use of bamboo stakes, galvanized wire hoops or mesh may be necessary for their support. Supports should be put in place before they have become too difficult to handle. The supports should not be taller than the mature height of the perennial plant.

Division of Perennials – Two or three-year-old perennials are easily divided in the spring if more plants are needed. To divide, cut out the entire section of plant to be divided, including roots. The larger divisions (those with three or more shoots), can be set out immediately in their permanent location, where they can be expected to bloom the same season. Smaller divisions are best planted in an out-of-the-way planting bed until the following autumn or spring, when they can be moved to their permanent location.

Weeding – All planting beds should be kept weed-free. Weed either by hand or with a pre-emergent herbicide such as Treflen used according to manufacturers' specifications. Manual weeding is to be used in combination with the use of spot applications of herbicides. Both live and dead weeds are to be pulled and removed from the site.

All herbicide applications shall be documented in the Landscape Maintenance Log. The actual product label or the manufacturer's product specification sheet for the specific product shall also be included in the Log.

Only personnel with appropriate applicator licenses shall supervise and/or perform the application of pesticide products requiring a license.

Winterizing – Perennial gardens should be cleaned-up when growth ceases in the fall. Remove foliage of plants that normally die down to the ground. Divide and replant over-grown clumps.

C. Lawn Areas - Turf Systems

Mowing – Proper mowing is an integral part of any good turf maintenance program. Without it, the finest in fertilization, watering and other vital maintenance practices would be completely ineffective. Proper mowing will help control dicot weeds; help the turf survive during periods of extreme heat, and gain strength and vigor to resist disease and other infestations.

Mowing height – The proper mowing height will vary somewhat according to the type of grass. The most common type of seed & sod lawns contain a mixture of bluegrass, fine fescue and perennial rye, which should be mowed at 2-3 inches.

Mowing frequency – The basic rule of thumb for mowing frequency is to never remove more than 1/3 of the grass blade in one mowing. Example: if you want to mow your turf at 2 inches, you should cut it when it reaches 3 inches. Removing more than 1/2 of the grass plant at a time can put the plant into shock, thus making it more susceptible to stress disease and weed infestation.

Mowing frequency will vary with the growing season and should be set by the plant height and not a set date. It will often be necessary to mow twice a week during periods of surge growth to help maintain plant health and color. Mowing should be cut back during periods of stress.

Grass clippings should be removed whenever they are thick enough to layer the turf. The return of clippings to the soil actually adds nutrients and helps retain moisture. Heavily clumped grass clippings are a sign of infrequent mowing, calling for an adjustment in the mowing schedule.

When mowing any area, try to alternate mowing patterns. This tends to keep grass blades more erect and assures an even cut. A dull mower will cause color loss due to tearing of the turf plant, and since mowing will ultimately determine the appearance of any turf area there is an absolute necessity for a clean sharp cut.

Weed & Pest Control and Fertilizing- In order to maintain turf grass health, vigor color, and nutrients, fertilizer must be added to the soil. Recommendations for fertilization of lawn areas are as follows; fertilize at the rate of one (1) pound of nitrogen per thousand square feet, per year is optimum. Fertilizer should be a balanced slow release, sulfur coated type fertilizer.

Weed Control - All turf areas will require some weed control, for both weed grasses and dicot weeds. Weeds should be treated at the appropriate time and with a material labeled for the target weed. Please refer to the fertilizer weed and pest schedule for timing.

Pest Control - All turf areas will require some pest control. Pests should be treated at the appropriate time with a material labeled for the target pest. Please refer to the fertilizer, weed and pest schedule for timing.

Lime - A common cause for an unhealthy lawn is acidic soil. When the pH is below the neutral range (between 6-7) vital plant nutrients become fixed in the soil and cannot be absorbed by the grass plant. Lime corrects an acid soil condition, supplies calcium for plant growth and improves air and water circulation. Limestone applied at the rate of 50 lbs. per thousand square feet will adjust the soil pH one point over a period of 6-9 months.

D. Fertilizer, Weed & Pest Control Schedule – Turf Systems

Spring - Fertilize one (1) pound of nitrogen per 1,000 square feet
(April) Pre-emergent weed grass control
Broadleaf weed control

Late Spring - Fertilize one (1) pound of nitrogen per 1,000 square feet
(June) Pre-emergent weed grass control
Broadleaf weed control
Insect Control (if needed)

*Summer - Fertilize one (1) pound of nitrogen per 1,000 square feet
(August) Broadleaf weed control (if needed)
Insect Control (if needed)

Fall - Fertilize one (1) pound of nitrogen per 1,000 square feet
(September)

*Omit if area is not to be irrigated

Lawn Maintenance Task Schedule

MARCH (Weather permitting)

- Clean up winter debris, sand, leaves, trash etc.
- Re-edge mulch beds, maintain at 2-3" maximum.
- Fertilize plants
- Aerate and thatch turf (conditions permitting)

APRIL

- Reseed or sod all areas needing attention.
- Fertilize and weed control
- Lime
- Start mowing when grass reaches 2-1/2", mow to 2"

MAY

- Mow turf to 2-2-1/2"
- Weed as necessary.
- Check for disease and pest problems in both turf and plants.

JUNE

- Mow turf to 2-1/2" – 3"
- Fertilize and weed control.
- Weed
- Check for disease and pest problems in both turf and plants, treat as necessary.

PROVISIONS FOR SOLID WASTE MANAGEMENT (SITE TRASH)

Trash will be placed in on-site dumpsters and the Owner will make provisions for its regular and timely removal.

SNOW DISPOSAL AND PLOWING PLANS

The purpose of the snow and snowmelt management plan is to provide guidelines regarding snow disposal site selection, site preparation and maintenance that are acceptable to the Department of Environmental Protection. For the areas that require snow removal, snow storage onsite will largely be accomplished by using pervious areas along the shoulder of the roadway and development as windrowed by plows.

- Avoid dumping of snow into any water body, including rivers, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater basins. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.
- In significant storm events, the melting or off-site trucking of snow may be implemented. These activities shall be conducted in accordance with all local, state and federal regulations.
- Snow shall be removed from the areas around on-site fire-hydrants to maintain emergency access to hydrants at all times. Removable flags or markers should be placed on hydrants to allow snow removal crews to more easily locate hydrants and not damage them with plows or other snow removal equipment.

WINTER ROAD SALT AND/OR SAND USE AND STORAGE RESTRICTIONS

The applicant will be responsible for sanding and salting the site. No storage on site.

STREET SWEEPING SCHEDULES

There are three types of sweepers: Mechanical, Regenerative Air, and Vacuum Filter.

- 1) Mechanical: Mechanical sweepers use brooms or rotary brushes to scour the pavement.
- 2) Regenerative Air: These sweepers blow air onto the road or parking lot surface, causing fines to rise where they are vacuumed.
- 3) Vacuum filter: These sweepers remove fines along roads. Two general types of vacuum filter sweepers are available - wet and dry. The dry type uses a broom in combination with the vacuum. The wet type uses water for dust suppression

Regardless of the type chosen, the efficiency of street sweeping is increased when sweepers are operated in tandem.

This project has not included street sweeping as part of the TSS removal calculations. However, it is recommended that street sweeping of the parking areas occur four times a year, including once after the spring snow melt.

Reuse and Disposal of Street Sweepings

Once removed from paved surfaces, the sweepings must be handled and disposed of properly. Mass DEP's Bureau of Waste Prevention has issued a written policy regarding the reuse and disposal of street sweepings. These sweepings are regulated as a solid waste, and can be used in three ways:

- In one of the ways already approved by Mass DEP (e.g., daily cover in a landfill, additive to compost, fill in a public way)
- If approved under a Beneficial Use Determination
- Disposed in a landfill

TRAINING OF STAFF OR PERSONNEL INVOLVED WITH IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Long-Term Pollution Prevention Plan is to be implemented by property owner of the site. Trained and, if required, licensed Professionals are to be hired by the owner as applicable to implement the Long-Term Pollution Prevention Plan.

LIST OF EMERGENCY CONTACTS FOR IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The applicant will be required to implement the Long-Term Pollution Prevention Plan and will create and maintain a list of emergency contacts.

POST CONSTRUCTION PHASE INSPECTION SCHEDULE AND EVALUATION CHECKLIST

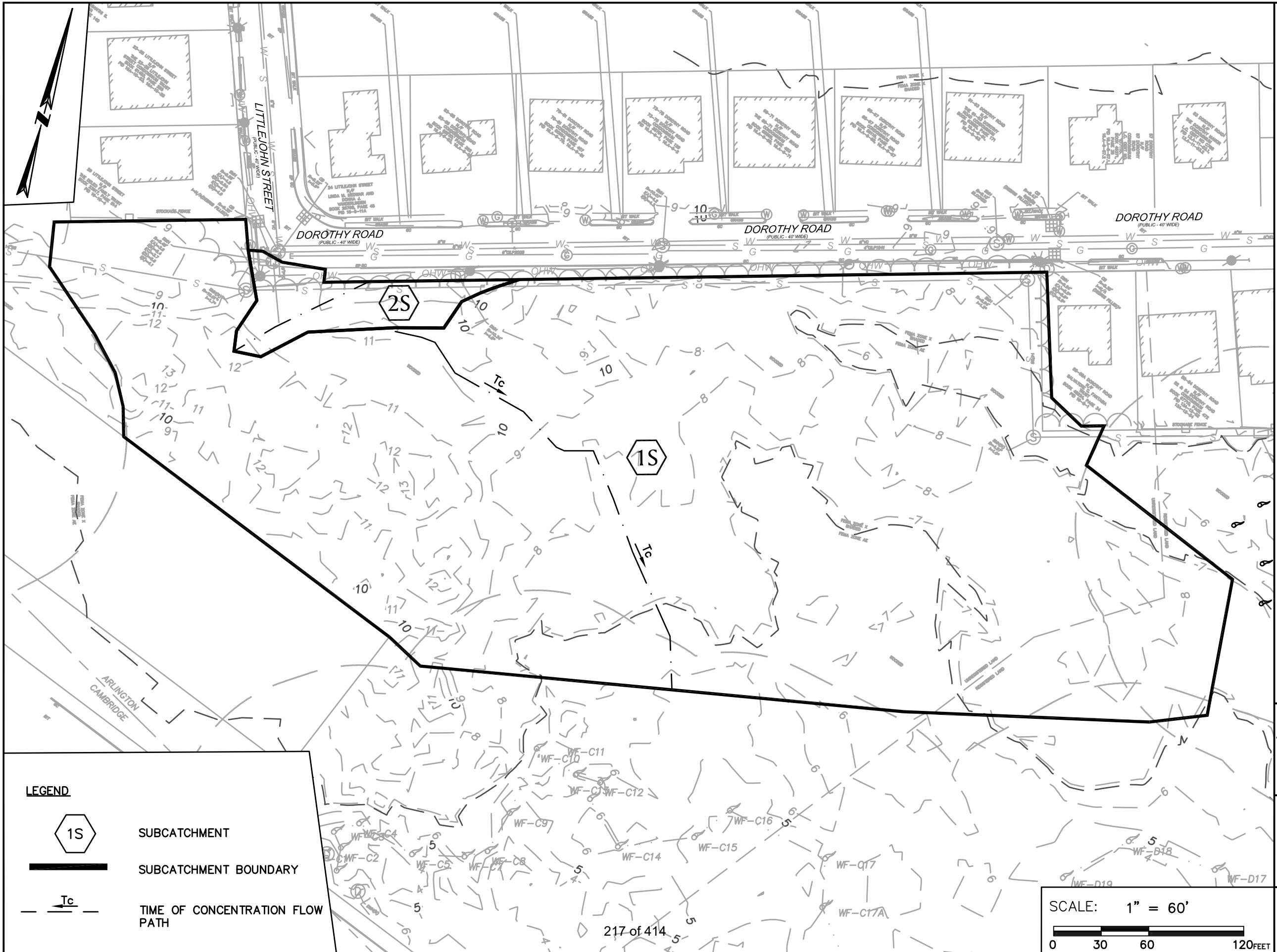
Inspection Date	Inspector	BMP Inspected	Inspection Frequency Requirements	Comments	Recommendation	Follow-up Inspection Required (yes/no)
		Catch Basin	Four times a year			
		Water Quality Units	Four times a year			
		Infiltration System	Twice a year			
		Pipe Outlet Protection	Once a year			

1. Refer to the Massachusetts Stormwater Handbook Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspections and maintenance of specific BMP's
2. Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.
3. Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.
4. Other Notes: (Include deviations from Conservation Commission Approvals, Planning Board Approvals and Approved Plans)

SECTION 5.0

HYDROLOGY CALCULATIONS

5.01 EXISTING WATERSHED PLAN



THORNDIKE PLACE

DOROTHY ROAD

ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

EXISTING WATERSHED
PLAN

NOVEMBER 3, 2020

PREPARED
FOR:
ARLINGTON LAND REALTY
84 SHERMAN STREET
CAMBRIDGE, MA

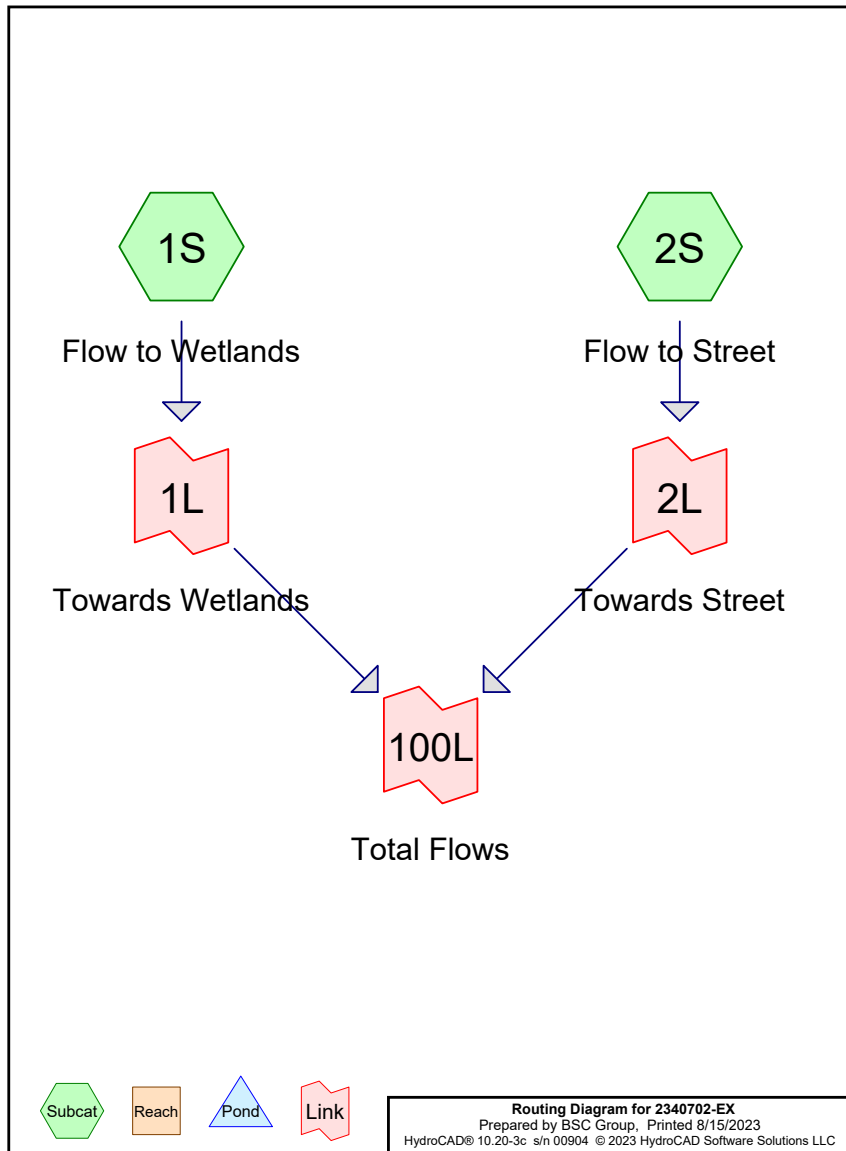


803 Summer Street
Boston, Massachusetts
02127

617.896.4300

Job No.: **23407.00** Date: **11/3/2020**
Scale: **1" = 60'** Revised: **08/18/2021**
Dwg No: **EXW**
File: **C:\DRAINAGE DESIGN\2340700-EXW**

5.02 EXISTING HYDROLOGY CALCULATIONS (HYDROCAD™ PRINTOUTS)



2340702-EX

Prepared by BSC Group

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Printed 8/15/2023

Page 2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
925	98	Paved parking, HSG C (2S)
157,761	70	Woods, Good, HSG C (1S, 2S)
158,686	70	TOTAL AREA

Soil Listing (all nodes)			
	Area	Soil	Subcatchment
	(sq-ft)	Group	Numbers
	0	HSG A	1S, 2S
	0	HSG B	
158,686		HSG C	
	0	HSG D	
	0	Other	
158,686		TOTAL AREA	

Ground Covers (all nodes)							
HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
0	0	925	0	0	925	Paved parking	2S
0	0	157,761	0	0	157,761	Woods, Good	1S,
							2S
0	0	158,686	0	0	158,686	TOTAL AREA	

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=151,732 sf 0.00% Impervious Runoff Depth>1.34"
Flow Length=310' Tc=17.5 min CN=70 Runoff=3.7 cfs 16,903 cf

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>1.61"
Flow Length=95' Tc=6.0 min CN=74 Runoff=0.3 cfs 932 cf

Link 1L: Towards Wetlands Inflow=3.7 cfs 16,903 cf
Primary=3.7 cfs 16,903 cf

Link 2L: Towards Street Inflow=0.3 cfs 932 cf
Primary=0.3 cfs 932 cf

Link 100L: Total Flows Inflow=3.8 cfs 17,836 cf
Primary=3.8 cfs 17,836 cf

Total Runoff Area = 158,686 sf Runoff Volume = 17,836 cf Average Runoff Depth = 1.35"
99.42% Pervious = 157,761 sf 0.58% Impervious = 925 sf

Summary for Subcatchment 1S: Flow to Wetlands

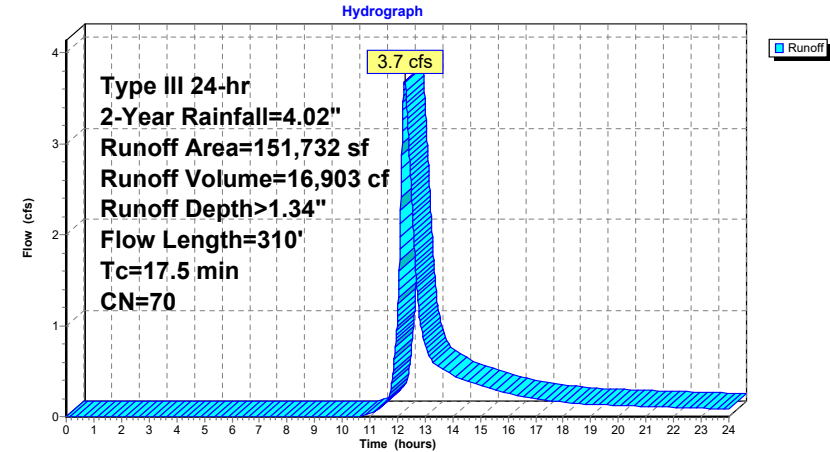
Runoff = 3.7 cfs @ 12.26 hrs, Volume= 16,903 cf, Depth> 1.34"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
151,732	70	Woods, Good, HSG C
151,732		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		Sheet Flow, A to B
6.1	260	0.0200	0.71		Woods: Light underbrush n= 0.400 P2= 3.23"
					Shallow Concentrated Flow, B to C
					Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

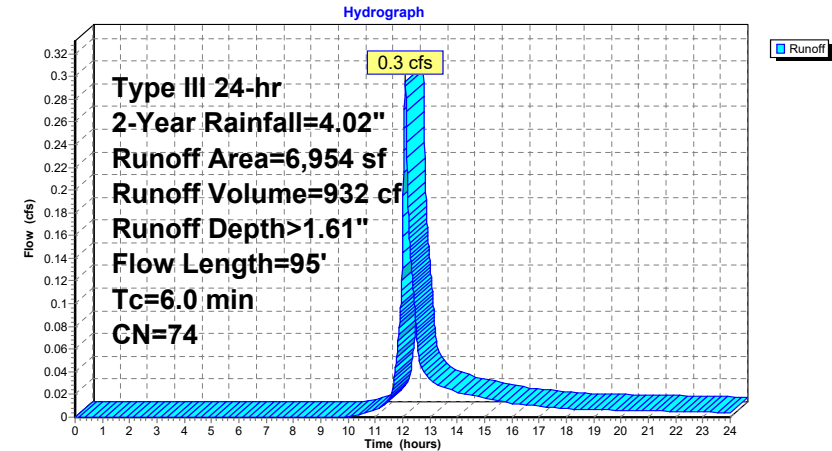
Runoff = 0.3 cfs @ 12.09 hrs, Volume= 932 cf, Depth> 1.61"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		Sheet Flow, A to B
1.8	75	0.0200	0.71		Woods: Light underbrush n= 0.400 P2= 3.23"
					Shallow Concentrated Flow, B to C
					Woodland Kv= 5.0 fps
5.3	95				Total, Increased to minimum Tc = 6.0 min

Subcatchment 2S: Flow to Street

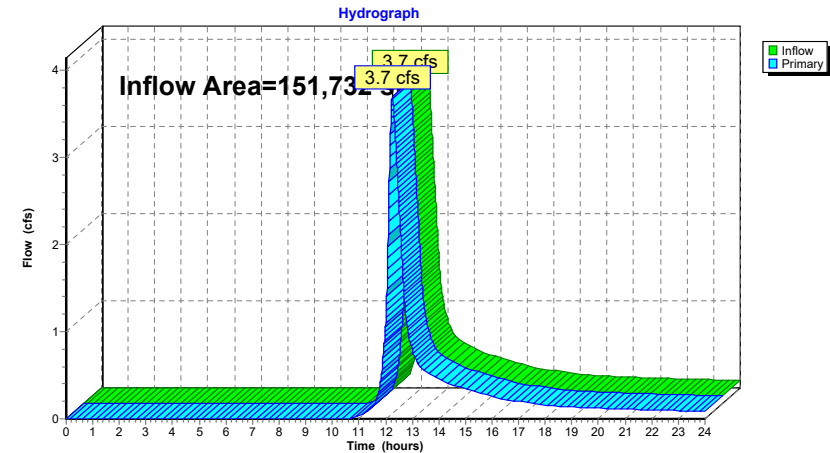


Summary for Link 1L: Towards Wetlands

Inflow Area = 151,732 sf, 0.00% Impervious, Inflow Depth > 1.34" for 2-Year event
Inflow = 3.7 cfs @ 12.26 hrs, Volume= 16,903 cf
Primary = 3.7 cfs @ 12.26 hrs, Volume= 16,903 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

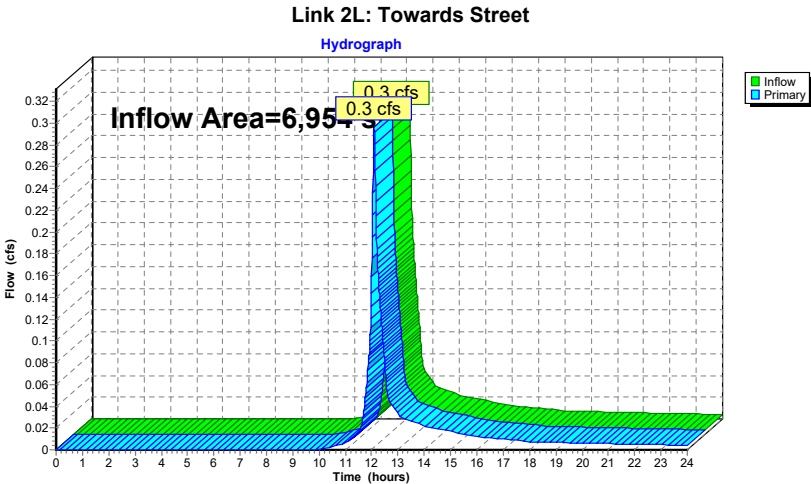
Link 1L: Towards Wetlands



Summary for Link 2L: Towards Street

Inflow Area = 6,954 sf, 13.30% Impervious, Inflow Depth > 1.61" for 2-Year event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 932 cf
Primary = 0.3 cfs @ 12.09 hrs, Volume= 932 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

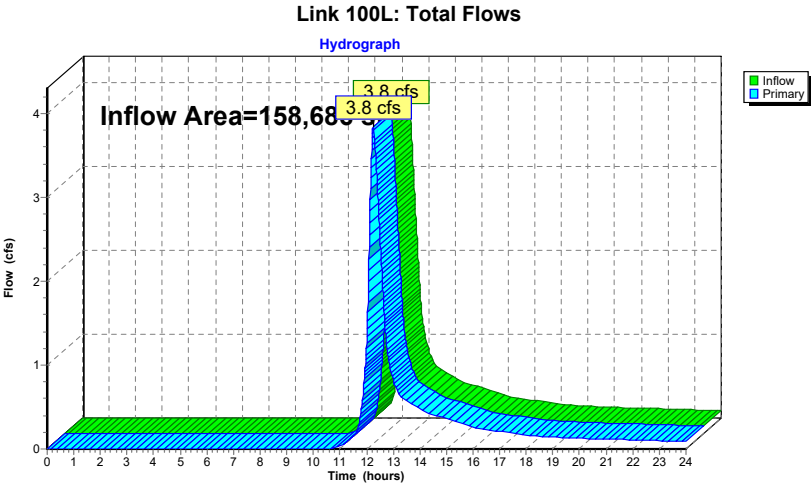
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 0.58% Impervious, Inflow Depth > 1.35" for 2-Year event
Inflow = 3.8 cfs @ 12.26 hrs, Volume= 17,836 cf
Primary = 3.8 cfs @ 12.26 hrs, Volume= 17,836 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=151,732 sf 0.00% Impervious Runoff Depth>3.11"
Flow Length=310' Tc=17.5 min CN=70 Runoff=9.0 cfs 39,374 cf

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>3.52"
Flow Length=95' Tc=6.0 min CN=74 Runoff=0.7 cfs 2,040 cf

Link 1L: Towards Wetlands Inflow=9.0 cfs 39,374 cf
Primary=9.0 cfs 39,374 cf

Link 2L: Towards Street Inflow=0.7 cfs 2,040 cf
Primary=0.7 cfs 2,040 cf

Link 100L: Total Flows Inflow=9.4 cfs 41,414 cf
Primary=9.4 cfs 41,414 cf

Total Runoff Area = 158,686 sf Runoff Volume = 41,414 cf Average Runoff Depth = 3.13"
99.42% Pervious = 157,761 sf 0.58% Impervious = 925 sf

Summary for Subcatchment 1S: Flow to Wetlands

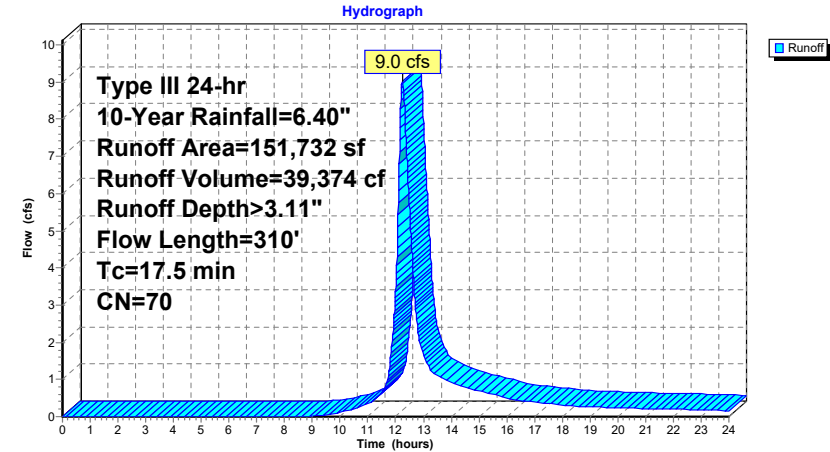
Runoff = 9.0 cfs @ 12.24 hrs, Volume= 39,374 cf, Depth> 3.11"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
151,732	70	Woods, Good, HSG C
151,732		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		Sheet Flow, A to B
					Woods: Light underbrush n= 0.400 P2= 3.23"
6.1	260	0.0200	0.71		Shallow Concentrated Flow, B to C
					Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

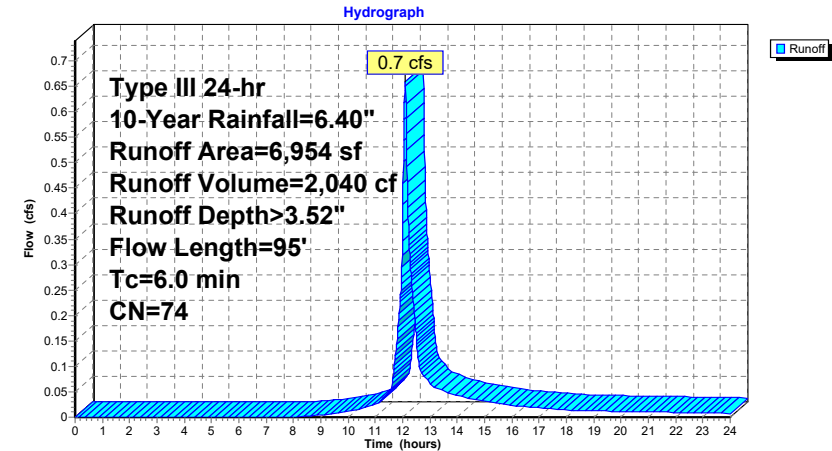
Runoff = 0.7 cfs @ 12.09 hrs, Volume= 2,040 cf, Depth> 3.52"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		Sheet Flow, A to B
					Woods: Light underbrush n= 0.400 P2= 3.23"
1.8	75	0.0200	0.71		Shallow Concentrated Flow, B to C
					Woodland Kv= 5.0 fps
5.3	95				Total, Increased to minimum Tc = 6.0 min

Subcatchment 2S: Flow to Street

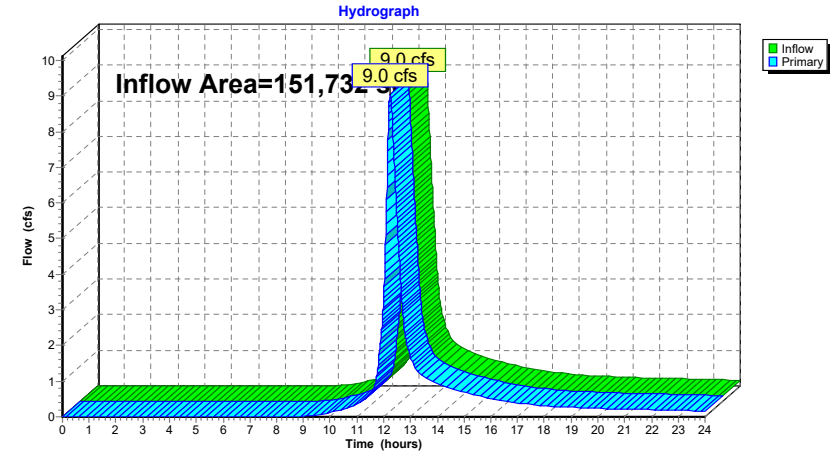


Summary for Link 1L: Towards Wetlands

Inflow Area = 151,732 sf, 0.00% Impervious, Inflow Depth > 3.11" for 10-Year event
Inflow = 9.0 cfs @ 12.24 hrs, Volume= 39,374 cf
Primary = 9.0 cfs @ 12.24 hrs, Volume= 39,374 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

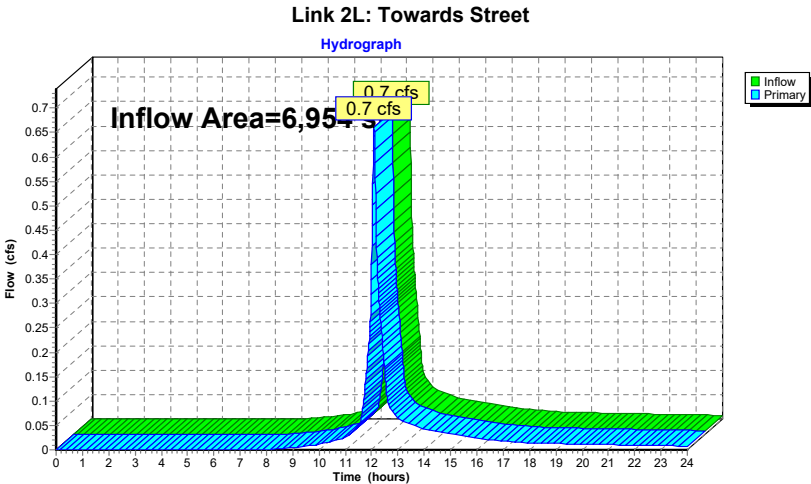
Link 1L: Towards Wetlands



Summary for Link 2L: Towards Street

Inflow Area = 6,954 sf, 13.30% Impervious, Inflow Depth > 3.52" for 10-Year event
Inflow = 0.7 cfs @ 12.09 hrs, Volume= 2,040 cf
Primary = 0.7 cfs @ 12.09 hrs, Volume= 2,040 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

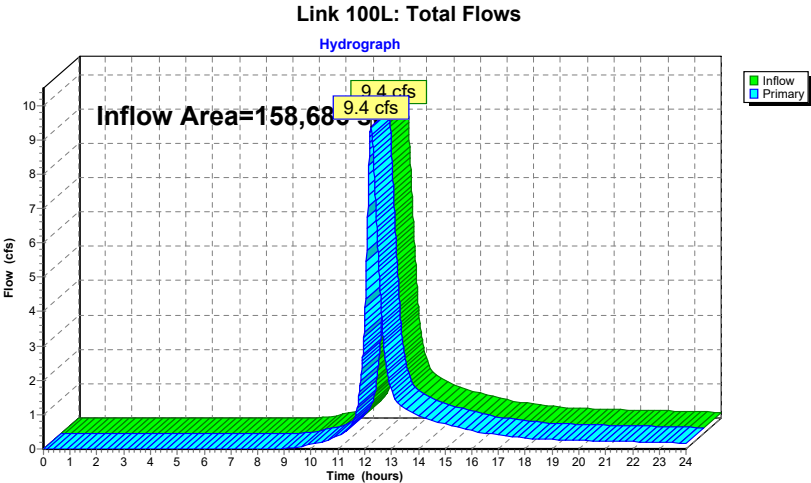
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 0.58% Impervious, Inflow Depth > 3.13" for 10-Year event
Inflow = 9.4 cfs @ 12.24 hrs, Volume= 41,414 cf
Primary = 9.4 cfs @ 12.24 hrs, Volume= 41,414 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=151,732 sf 0.00% Impervious Runoff Depth>4.71"
Flow Length=310' Tc=17.5 min CN=70 Runoff=13.7 cfs 59,512 cf

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>5.19"
Flow Length=95' Tc=6.0 min CN=74 Runoff=1.0 cfs 3,007 cf

Link 1L: Towards Wetlands Inflow=13.7 cfs 59,512 cf
Primary=13.7 cfs 59,512 cf

Link 2L: Towards Street Inflow=1.0 cfs 3,007 cf
Primary=1.0 cfs 3,007 cf

Link 100L: Total Flows Inflow=14.2 cfs 62,519 cf
Primary=14.2 cfs 62,519 cf

Total Runoff Area = 158,686 sf Runoff Volume = 62,519 cf Average Runoff Depth = 4.73"
99.42% Pervious = 157,761 sf 0.58% Impervious = 925 sf

Summary for Subcatchment 1S: Flow to Wetlands

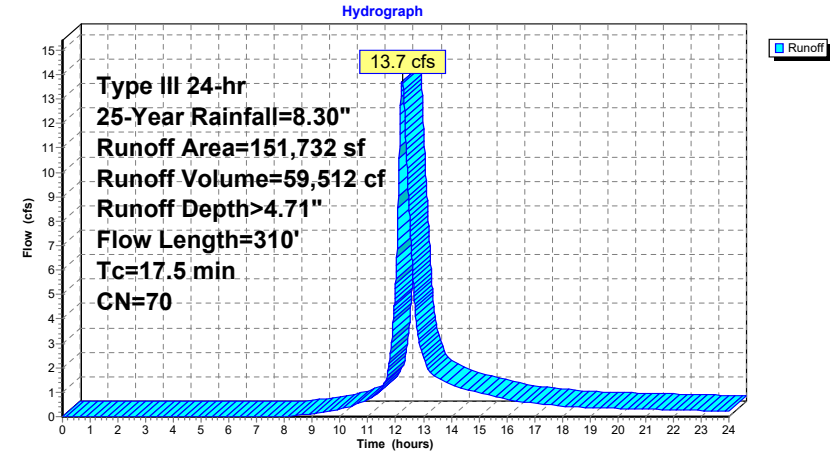
Runoff = 13.7 cfs @ 12.23 hrs, Volume= 59,512 cf, Depth> 4.71"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
151,732	70	Woods, Good, HSG C
151,732		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		Sheet Flow, A to B
6.1	260	0.0200	0.71		Woods: Light underbrush n= 0.400 P2= 3.23"
					Shallow Concentrated Flow, B to C
					Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

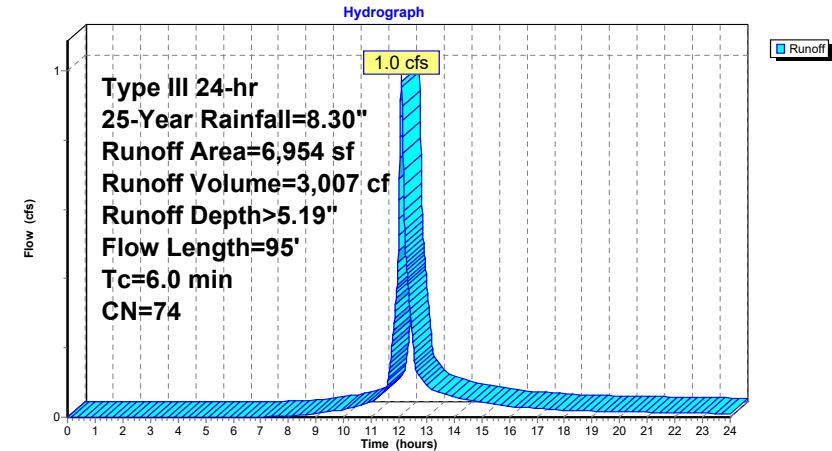
Runoff = 1.0 cfs @ 12.09 hrs, Volume= 3,007 cf, Depth> 5.19"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		Sheet Flow, A to B
					Woods: Light underbrush n= 0.400 P2= 3.23"
1.8	75	0.0200	0.71		Shallow Concentrated Flow, B to C
					Woodland Kv= 5.0 fps
5.3	95				Total, Increased to minimum Tc = 6.0 min

Subcatchment 2S: Flow to Street

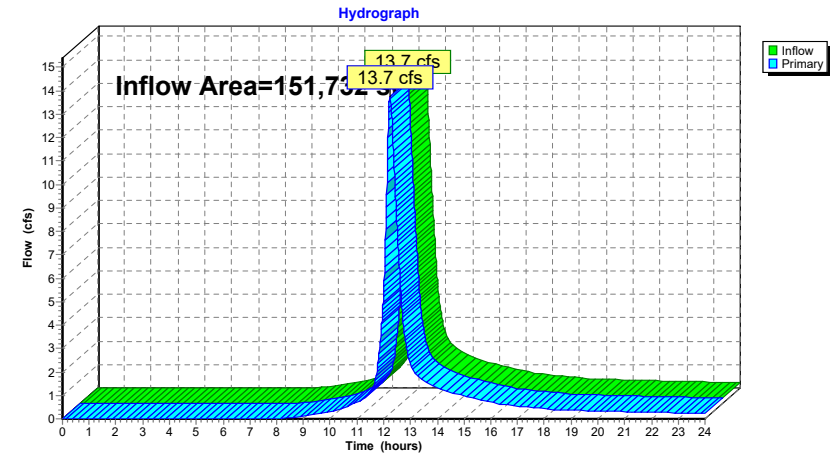


Summary for Link 1L: Towards Wetlands

Inflow Area = 151,732 sf, 0.00% Impervious, Inflow Depth > 4.71" for 25-Year event
Inflow = 13.7 cfs @ 12.23 hrs, Volume= 59,512 cf
Primary = 13.7 cfs @ 12.23 hrs, Volume= 59,512 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

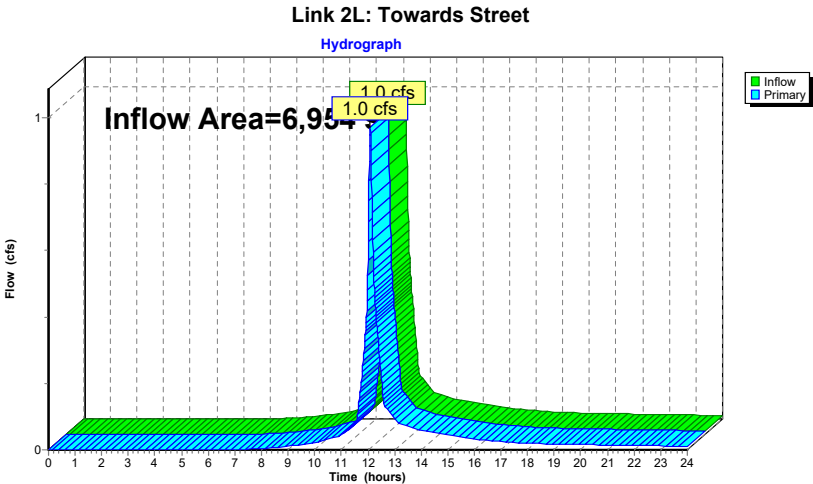
Link 1L: Towards Wetlands



Summary for Link 2L: Towards Street

Inflow Area = 6,954 sf, 13.30% Impervious, Inflow Depth > 5.19" for 25-Year event
Inflow = 1.0 cfs @ 12.09 hrs, Volume= 3,007 cf
Primary = 1.0 cfs @ 12.09 hrs, Volume= 3,007 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

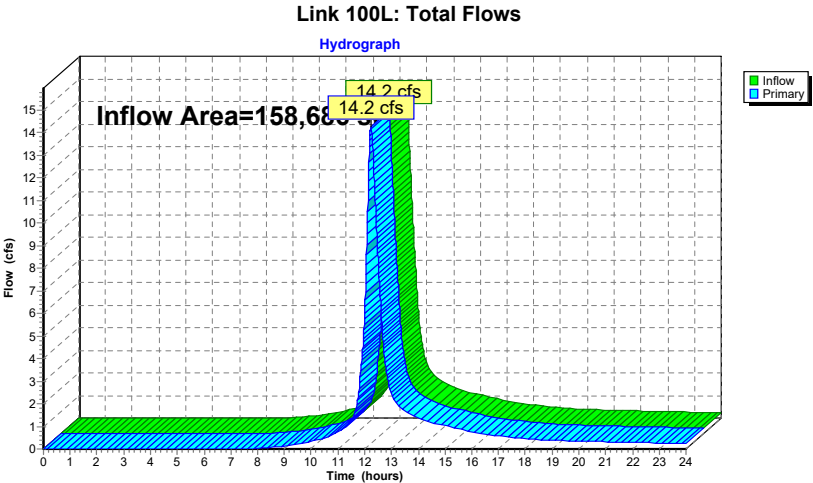
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 0.58% Impervious, Inflow Depth > 4.73" for 25-Year event
Inflow = 14.2 cfs @ 12.23 hrs, Volume= 62,519 cf
Primary = 14.2 cfs @ 12.23 hrs, Volume= 62,519 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=151,732 sf 0.00% Impervious Runoff Depth>5.91"
Flow Length=310' Tc=17.5 min CN=70 Runoff=17.2 cfs 74,721 cf

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>6.44"
Flow Length=95' Tc=6.0 min CN=74 Runoff=1.2 cfs 3,730 cf

Link 1L: Towards Wetlands Inflow=17.2 cfs 74,721 cf
Primary=17.2 cfs 74,721 cf

Link 2L: Towards Street Inflow=1.2 cfs 3,730 cf
Primary=1.2 cfs 3,730 cf

Link 100L: Total Flows Inflow=17.9 cfs 78,451 cf
Primary=17.9 cfs 78,451 cf

Total Runoff Area = 158,686 sf Runoff Volume = 78,451 cf Average Runoff Depth = 5.93"
99.42% Pervious = 157,761 sf 0.58% Impervious = 925 sf

Summary for Subcatchment 1S: Flow to Wetlands

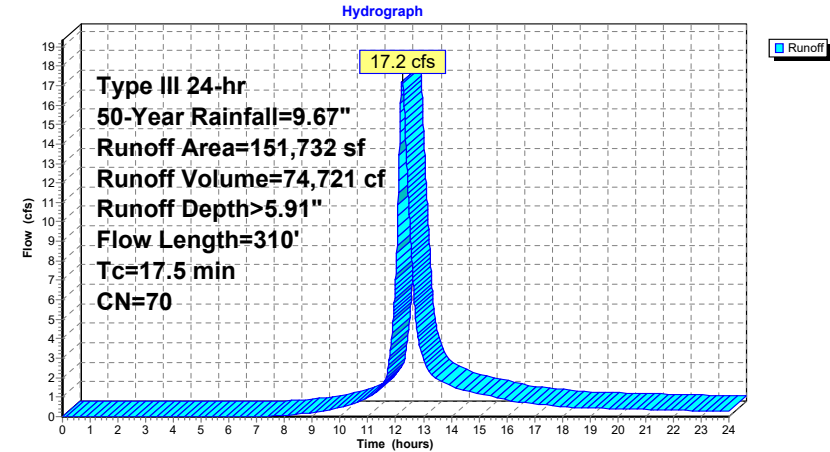
Runoff = 17.2 cfs @ 12.23 hrs, Volume= 74,721 cf, Depth> 5.91"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
151,732	70	Woods, Good, HSG C
151,732		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		Sheet Flow, A to B Woods: Light underbrush n= 0.400 P2= 3.23"
6.1	260	0.0200	0.71		Shallow Concentrated Flow, B to C Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

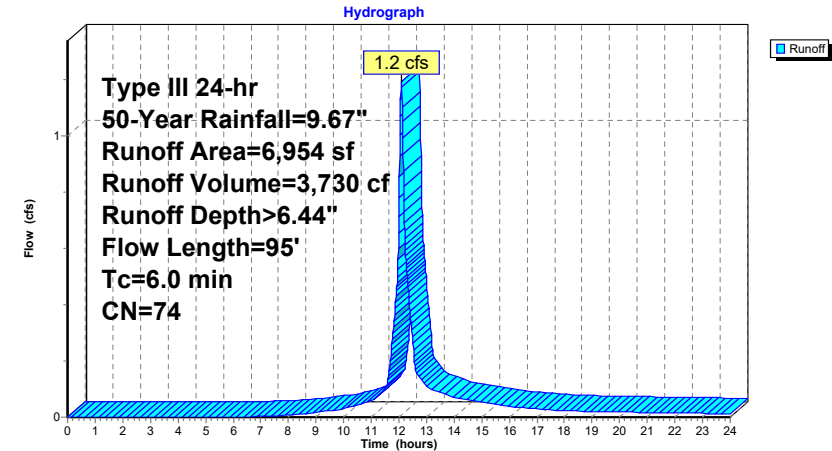
Runoff = 1.2 cfs @ 12.09 hrs, Volume= 3,730 cf, Depth> 6.44"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		Sheet Flow, A to B
					Woods: Light underbrush n= 0.400 P2= 3.23"
1.8	75	0.0200	0.71		Shallow Concentrated Flow, B to C
					Woodland Kv= 5.0 fps
5.3	95				Total, Increased to minimum Tc = 6.0 min

Subcatchment 2S: Flow to Street

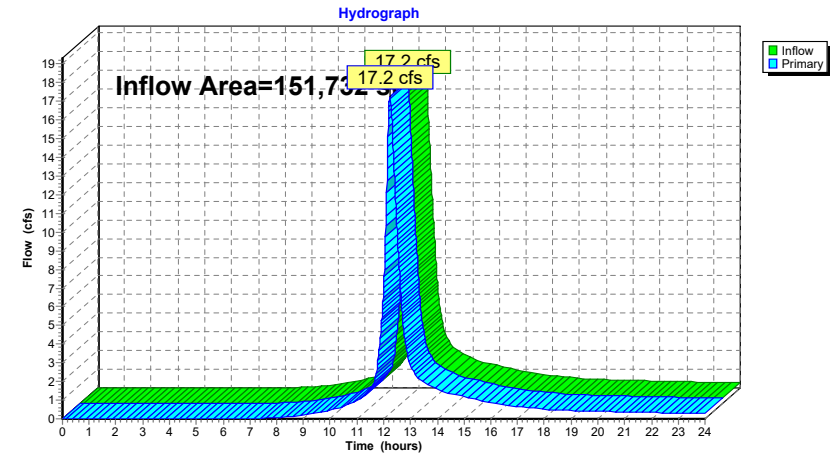


Summary for Link 1L: Towards Wetlands

Inflow Area = 151,732 sf, 0.00% Impervious, Inflow Depth > 5.91" for 50-Year event
Inflow = 17.2 cfs @ 12.23 hrs, Volume= 74,721 cf
Primary = 17.2 cfs @ 12.23 hrs, Volume= 74,721 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

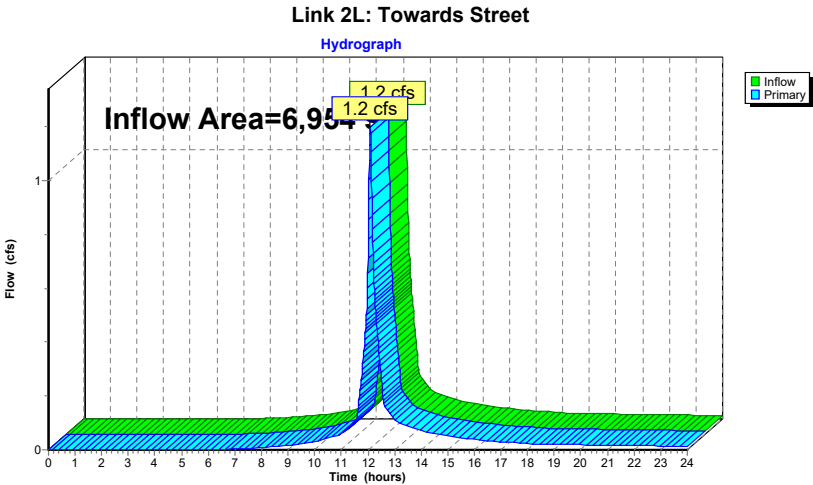
Link 1L: Towards Wetlands



Summary for Link 2L: Towards Street

Inflow Area = 6,954 sf, 13.30% Impervious, Inflow Depth > 6.44" for 50-Year event
Inflow = 1.2 cfs @ 12.09 hrs, Volume= 3,730 cf
Primary = 1.2 cfs @ 12.09 hrs, Volume= 3,730 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

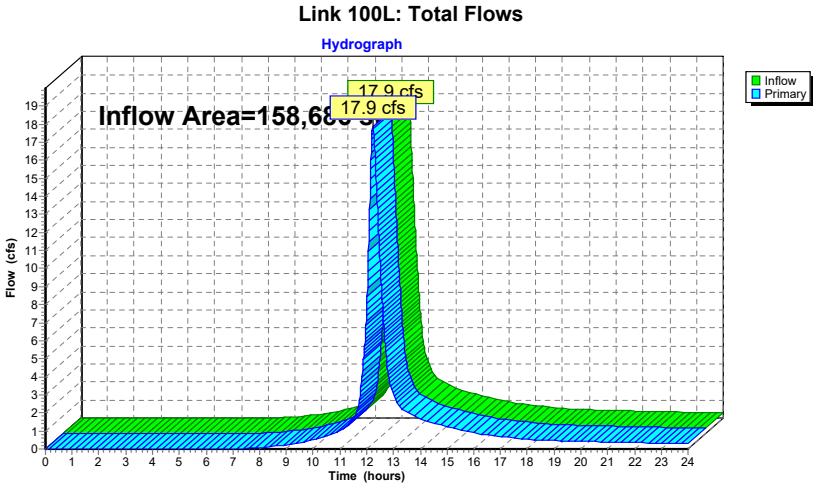
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 0.58% Impervious, Inflow Depth > 5.93" for 50-Year event
Inflow = 17.9 cfs @ 12.23 hrs, Volume= 78,451 cf
Primary = 17.9 cfs @ 12.23 hrs, Volume= 78,451 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Flow to Wetlands Runoff Area=151,732 sf 0.00% Impervious Runoff Depth>7.56"
Flow Length=310' Tc=17.5 min CN=70 Runoff=22.0 cfs 95,631 cf

Subcatchment 2S: Flow to Street Runoff Area=6,954 sf 13.30% Impervious Runoff Depth>8.14"
Flow Length=95' Tc=6.0 min CN=74 Runoff=1.5 cfs 4,716 cf

Link 1L: Towards Wetlands Inflow=22.0 cfs 95,631 cf
Primary=22.0 cfs 95,631 cf

Link 2L: Towards Street Inflow=1.5 cfs 4,716 cf
Primary=1.5 cfs 4,716 cf

Link 100L: Total Flows Inflow=22.7 cfs 100,347 cf
Primary=22.7 cfs 100,347 cf

Total Runoff Area = 158,686 sf Runoff Volume = 100,347 cf Average Runoff Depth = 7.59"
99.42% Pervious = 157,761 sf 0.58% Impervious = 925 sf

Summary for Subcatchment 1S: Flow to Wetlands

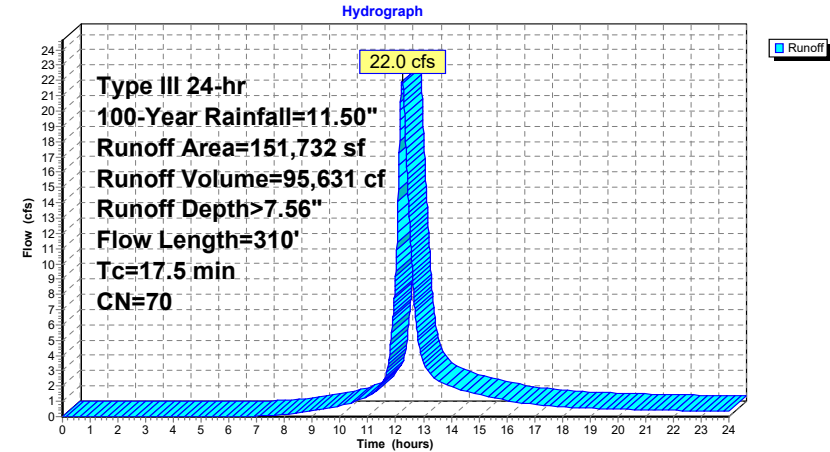
Runoff = 22.0 cfs @ 12.23 hrs, Volume= 95,631 cf, Depth> 7.56"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
151,732	70	Woods, Good, HSG C
151,732		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0240	0.07		Sheet Flow, A to B
6.1	260	0.0200	0.71		Woods: Light underbrush n= 0.400 P2= 3.23"
					Shallow Concentrated Flow, B to C
					Woodland Kv= 5.0 fps
17.5	310	Total			

Subcatchment 1S: Flow to Wetlands



Summary for Subcatchment 2S: Flow to Street

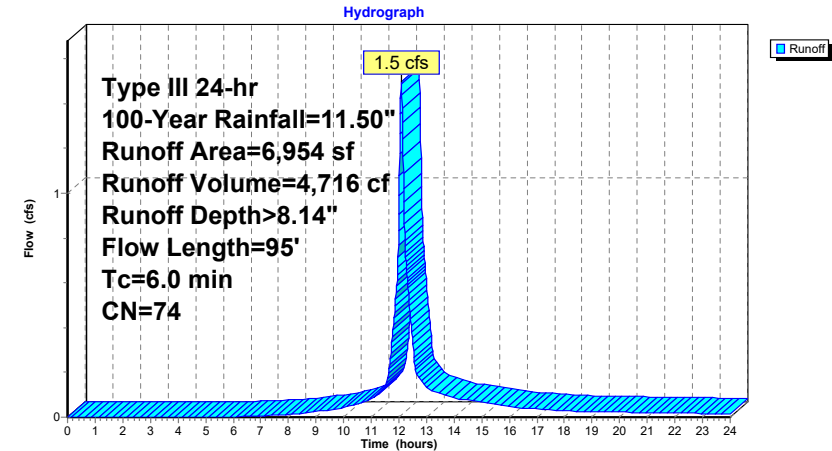
Runoff = 1.5 cfs @ 12.09 hrs, Volume= 4,716 cf, Depth> 8.14"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
6,029	70	Woods, Good, HSG C
925	98	Paved parking, HSG C
6,954	74	Weighted Average
6,029		86.70% Pervious Area
925		13.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	20	0.0750	0.10		Sheet Flow, A to B
					Woods: Light underbrush n= 0.400 P2= 3.23"
1.8	75	0.0200	0.71		Shallow Concentrated Flow, B to C
					Woodland Kv= 5.0 fps
5.3	95				Total, Increased to minimum Tc = 6.0 min

Subcatchment 2S: Flow to Street

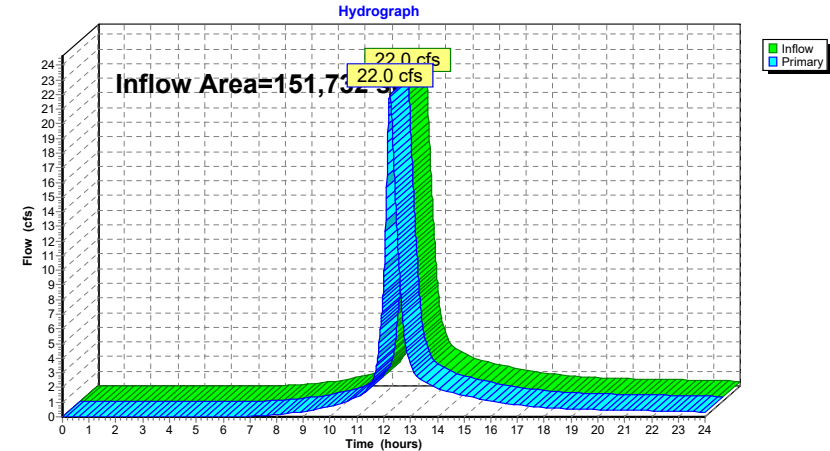


Summary for Link 1L: Towards Wetlands

Inflow Area = 151,732 sf, 0.00% Impervious, Inflow Depth > 7.56" for 100-Year event
Inflow = 22.0 cfs @ 12.23 hrs, Volume= 95,631 cf
Primary = 22.0 cfs @ 12.23 hrs, Volume= 95,631 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

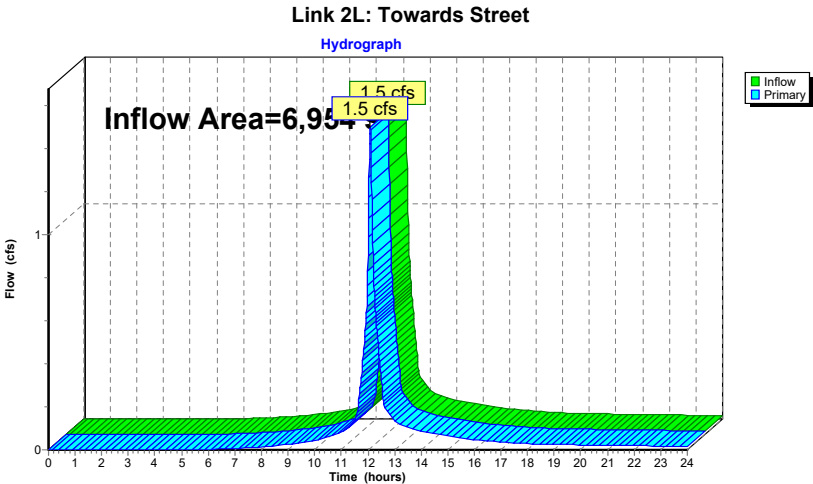
Link 1L: Towards Wetlands



Summary for Link 2L: Towards Street

Inflow Area = 6,954 sf, 13.30% Impervious, Inflow Depth > 8.14" for 100-Year event
Inflow = 1.5 cfs @ 12.09 hrs, Volume= 4,716 cf
Primary = 1.5 cfs @ 12.09 hrs, Volume= 4,716 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

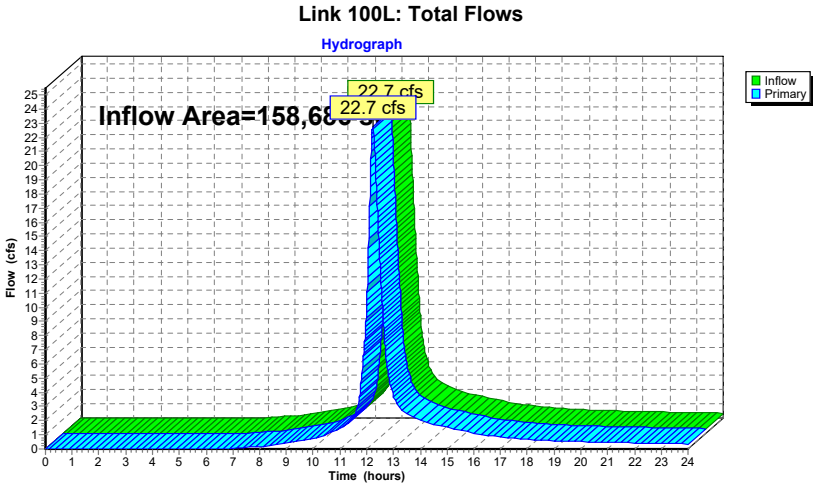
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



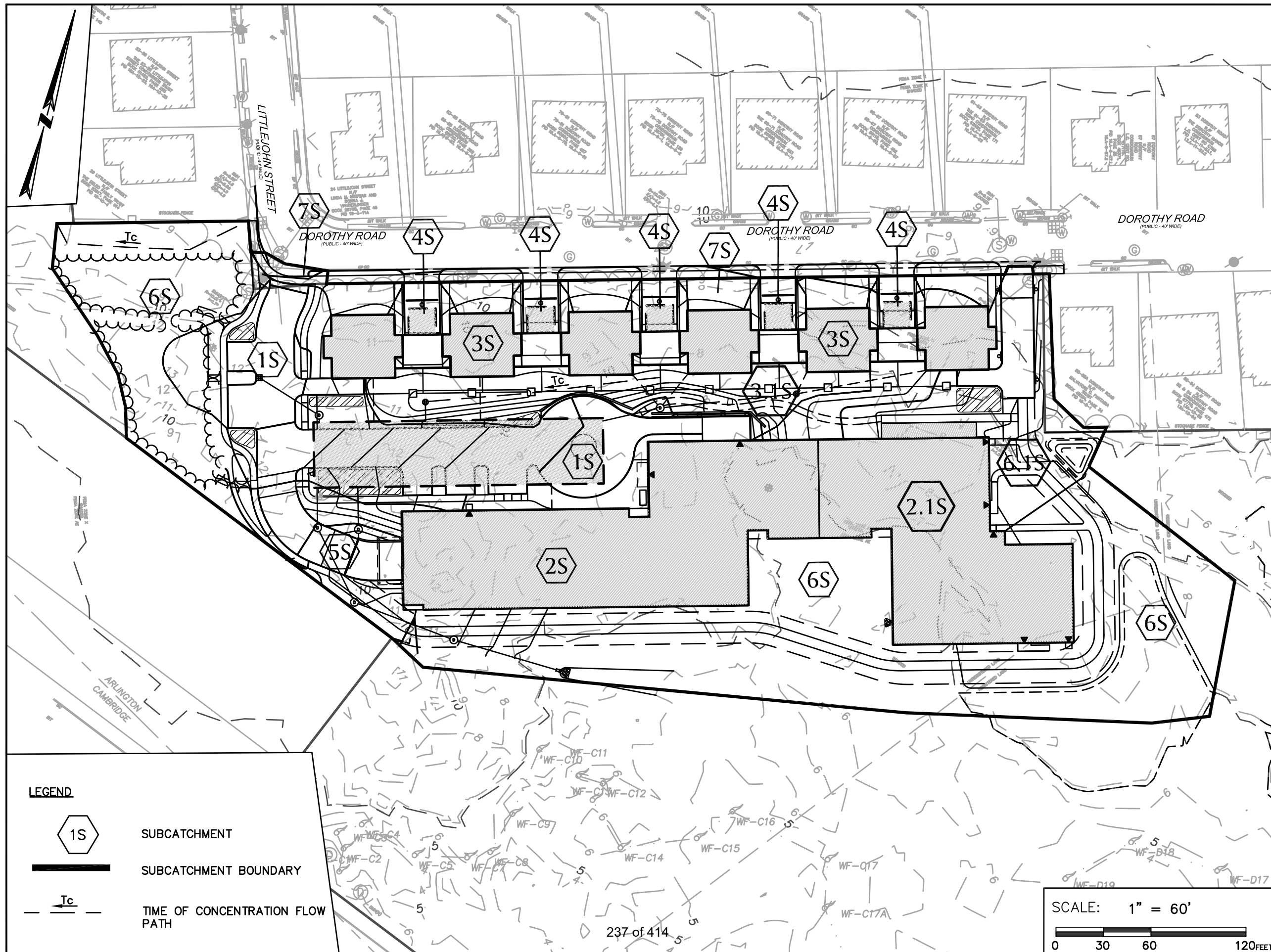
Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 0.58% Impervious, Inflow Depth > 7.59" for 100-Year event
Inflow = 22.7 cfs @ 12.23 hrs, Volume= 100,347 cf
Primary = 22.7 cfs @ 12.23 hrs, Volume= 100,347 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



5.03 PROPOSED WATERSHED PLAN



THORNDIKE PLACE

DOROTHY ROAD

ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

PROPOSED WATERSHED
PLAN

NOVEMBER 3, 2020

PREPARED
FOR:
ARLINGTON LAND REALTY
84 SHERMAN STREET
CAMBRIDGE, MA

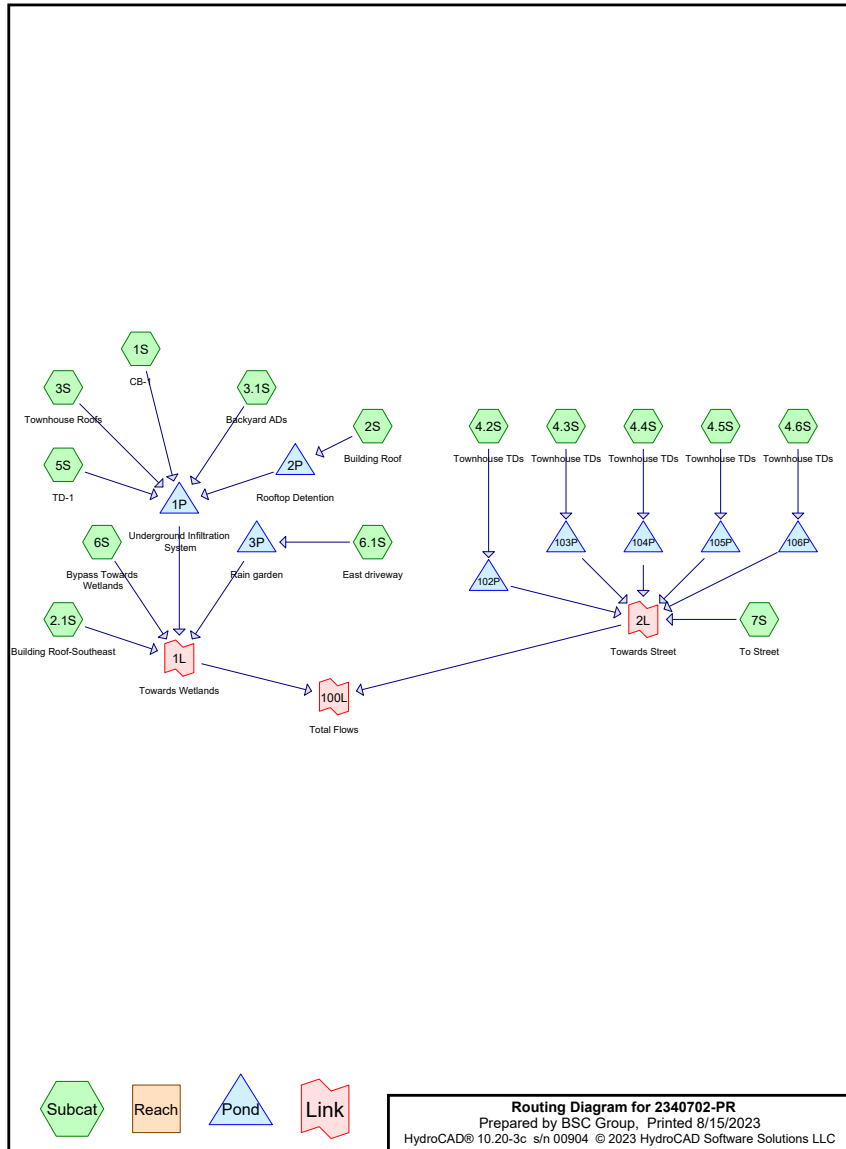


803 Summer Street
Boston, Massachusetts
02127

617.896.4300

Job No.: **23407.00** Date: **11/3/2020**
Scale: **1" = 60'** Revised: **08/18/2021**
Dwg No: **PRW**
File: **C:\DRAINAGE DESIGN\2340700-PRW**

5.04 PROPOSED HYDROLOGY CALCULATIONS (HYDROCAD™ PRINTOUTS)



2340702-PR

Prepared by BSC Group

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
74,444	74	>75% Grass cover, Good, HSG C (1S, 3.1S, 4.2S, 4.3S, 4.4S, 4.5S, 4.6S, 5S, 6.1S, 6S, 7S)
220	89	Gravel roads, HSG C (6.1S)
411	89	Gravel sidewalk, HSG C (3.1S)
25,811	98	Paved parking, HSG C (1S, 4.2S, 4.3S, 4.4S, 4.5S, 4.6S, 5S, 7S)
6,444	98	Paved roads w/curbs & sewers, HSG C (6.1S)
46,099	98	Roofs, HSG C (2.1S, 2S, 3S, 6S)
272	98	Unconnected pavement, HSG C (3.1S)
4,985	70	Woods, Good, HSG C (6S)
158,686	86	TOTAL AREA

Soil Listing (all nodes)		
Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	1S, 2.1S, 2S, 3.1S, 3S, 4.2S, 4.3S, 4.4S, 4.5S, 4.6S, 5S, 6.1S, 6S, 7S
0	HSG B	
158,686	HSG C	
0	HSG D	
0	Other	
158,686	TOTAL AREA	

Ground Covers (all nodes)						
HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	0	74,444	0	0	74,444	>75% Grass cover, Good
0	0	220	0	0	220	Gravel roads
0	0	411	0	0	411	Gravel sidewalk
0	0	25,811	0	0	25,811	Paved parking
0	0	6,444	0	0	6,444	Paved roads w/curbs & sewers
0	0	46,099	0	0	46,099	Roofs
0	0	272	0	0	272	Unconnected pavement
0	0	4,985	0	0	4,985	Woods, Good
0	0	158,686	0	0	158,686	TOTAL AREA

2340702-PR

Prepared by BSC Group

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Type III 24-hr 2-Year Rainfall=4.02"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1	Runoff Area=22,742 sf 72.16% Impervious Runoff Depth=3.04" Tc=6.0 min CN=91 Runoff=1.8 cfs 5,755 cf
Subcatchment 2.1S: Building	Runoff Area=14,140 sf 100.00% Impervious Runoff Depth=3.79" Tc=6.0 min CN=98 Runoff=1.3 cfs 4,460 cf
Subcatchment 2S: Building Roof	Runoff Area=18,785 sf 100.00% Impervious Runoff Depth=3.79" Tc=6.0 min CN=98 Runoff=1.7 cfs 5,925 cf
Subcatchment 3.1S: Backyard ADs	Runoff Area=8,985 sf 3.03% Impervious Runoff Depth=1.68" Flow Length=147' Tc=10.3 min CN=75 Runoff=0.3 cfs 1,259 cf
Subcatchment 3S: Townhouse Roofs	Runoff Area=13,067 sf 100.00% Impervious Runoff Depth=3.79" Tc=6.0 min CN=98 Runoff=1.2 cfs 4,122 cf
Subcatchment 4.2S: Townhouse TDs	Runoff Area=1,112 sf 95.68% Impervious Runoff Depth=3.67" Tc=6.0 min CN=97 Runoff=0.1 cfs 340 cf
Subcatchment 4.3S: Townhouse TDs	Runoff Area=1,105 sf 97.29% Impervious Runoff Depth=3.67" Tc=6.0 min CN=97 Runoff=0.1 cfs 338 cf
Subcatchment 4.4S: Townhouse TDs	Runoff Area=1,104 sf 97.46% Impervious Runoff Depth=3.67" Tc=6.0 min CN=97 Runoff=0.1 cfs 338 cf
Subcatchment 4.5S: Townhouse TDs	Runoff Area=1,082 sf 98.06% Impervious Runoff Depth=3.79" Tc=6.0 min CN=98 Runoff=0.1 cfs 341 cf
Subcatchment 4.6S: Townhouse TDs	Runoff Area=1,056 sf 99.24% Impervious Runoff Depth=3.79" Tc=6.0 min CN=98 Runoff=0.1 cfs 333 cf
Subcatchment 5S: TD-1	Runoff Area=5,851 sf 51.63% Impervious Runoff Depth=2.56" Tc=6.0 min CN=86 Runoff=0.4 cfs 1,250 cf
Subcatchment 6.1S: East driveway	Runoff Area=12,275 sf 52.50% Impervious Runoff Depth=2.66" Tc=6.0 min CN=87 Runoff=0.9 cfs 2,716 cf
Subcatchment 6S: Bypass Towards	Runoff Area=51,539 sf 0.21% Impervious Runoff Depth=1.61" Flow Length=125' Tc=14.0 min CN=74 Runoff=1.7 cfs 6,919 cf
Subcatchment 7S: To Street	Runoff Area=5,843 sf 18.07% Impervious Runoff Depth=1.90" Tc=6.0 min CN=78 Runoff=0.3 cfs 927 cf
Pond 1P: Underground Infiltration System	Peak Elev=7.62' Storage=11,323 cf Inflow=3.8 cfs 18,298 cf Discarded=0.1 cfs 17,316 cf Primary=0.1 cfs 982 cf Outflow=0.2 cfs 18,298 cf
Pond 2P: Rooftop Detention	Peak Elev=57.21' Storage=3,080 cf Inflow=1.7 cfs 5,925 cf Outflow=0.2 cfs 5,913 cf

2340702-PR

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Type III 24-hr 2-Year Rainfall=4.02"

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Pond 3P: Rain garden	Peak Elev=6.37' Storage=196 cf Inflow=0.9 cfs 2,716 cf Discarded=0.0 cfs 411 cf Primary=0.9 cfs 2,305 cf Outflow=0.9 cfs 2,716 cf
Pond 102P:	Peak Elev=6.71' Storage=189 cf Inflow=0.1 cfs 340 cf Discarded=0.0 cfs 340 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 340 cf
Pond 103P:	Peak Elev=6.71' Storage=187 cf Inflow=0.1 cfs 338 cf Discarded=0.0 cfs 338 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 338 cf
Pond 104P:	Peak Elev=6.71' Storage=187 cf Inflow=0.1 cfs 338 cf Discarded=0.0 cfs 338 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 338 cf
Pond 105P:	Peak Elev=6.70' Storage=186 cf Inflow=0.1 cfs 341 cf Discarded=0.0 cfs 341 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 341 cf
Pond 106P:	Peak Elev=6.68' Storage=180 cf Inflow=0.1 cfs 333 cf Discarded=0.0 cfs 333 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 333 cf
Link 1L: Towards Wetlands	Inflow=3.4 cfs 14,666 cf Primary=3.4 cfs 14,666 cf
Link 2L: Towards Street	Inflow=0.3 cfs 927 cf Primary=0.3 cfs 927 cf
Link 100L: Total Flows	Inflow=3.6 cfs 15,592 cf Primary=3.6 cfs 15,592 cf
Total Runoff Area = 158,686 sf Runoff Volume = 35,023 cf Average Runoff Depth = 2.65" 50.45% Pervious = 80,060 sf 49.55% Impervious = 78,626 sf	

Summary for Subcatchment 1S: CB-1

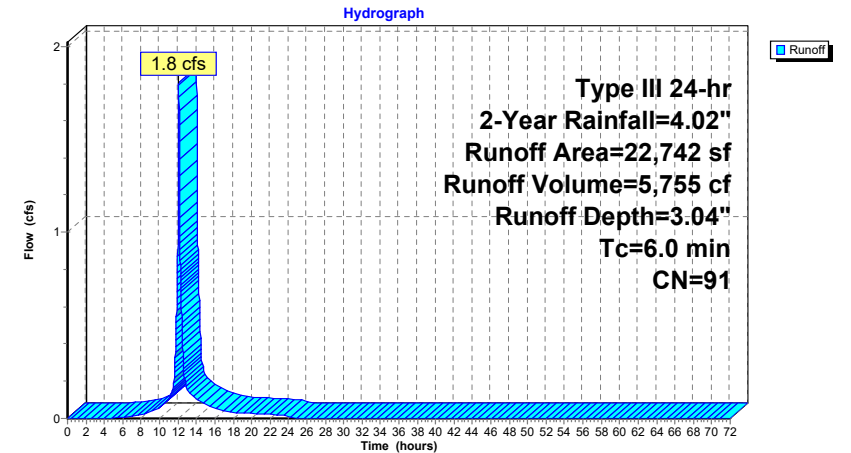
Runoff = 1.8 cfs @ 12.09 hrs, Volume= 5,755 cf, Depth= 3.04"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
16,410	98	Paved parking, HSG C
6,332	74	>75% Grass cover, Good, HSG C
22,742	91	Weighted Average
6,332		27.84% Pervious Area
16,410		72.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 1S: CB-1



Summary for Subcatchment 2.1S: Building Roof-Southeast

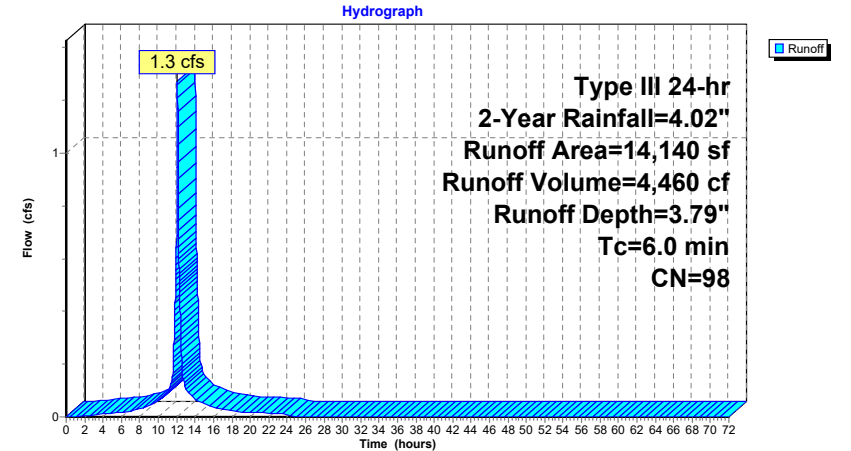
Runoff = 1.3 cfs @ 12.08 hrs, Volume= 4,460 cf, Depth= 3.79"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
14,140	98	Roofs, HSG C
14,140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2.1S: Building Roof-Southeast



Summary for Subcatchment 2S: Building Roof

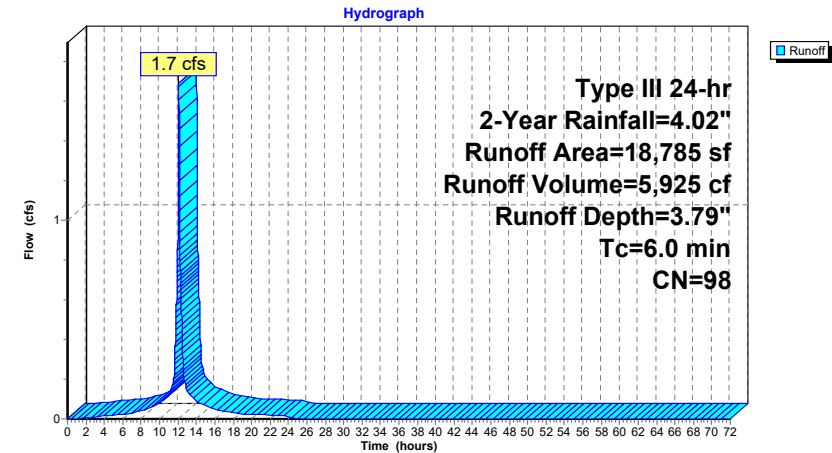
Runoff = 1.7 cfs @ 12.08 hrs, Volume= 5,925 cf, Depth= 3.79"
Routed to Pond 2P : Rooftop Detention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
18,785	98	Roofs, HSG C
18,785		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2S: Building Roof



Summary for Subcatchment 3.1S: Backyard ADs

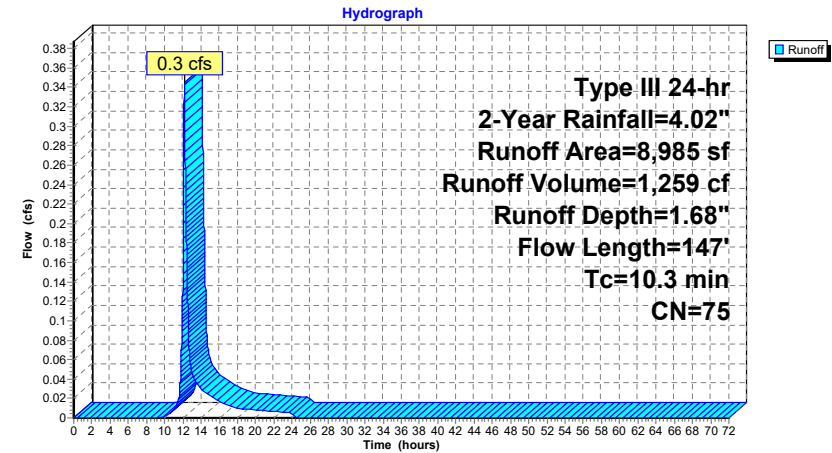
Runoff = 0.3 cfs @ 12.15 hrs, Volume= 1,259 cf, Depth= 1.68"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
272	98	Unconnected pavement, HSG C
8,302	74	>75% Grass cover, Good, HSG C
411	89	Gravel sidewalk, HSG C
8,985	75	Weighted Average
8,713		96.97% Pervious Area
272		3.03% Impervious Area
272		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0142	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.23"
0.9	97	0.0154	1.86		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
10.3	147				Total

Subcatchment 3.1S: Backyard ADs



Summary for Subcatchment 3S: Townhouse Roofs

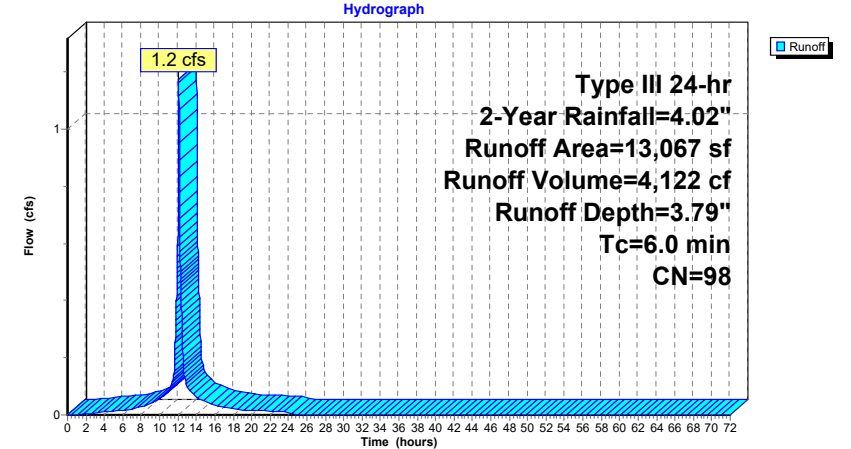
Runoff = 1.2 cfs @ 12.08 hrs, Volume= 4,122 cf, Depth= 3.79"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
13,067	98	Roofs, HSG C
13,067		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 3S: Townhouse Roofs



Summary for Subcatchment 4.2S: Townhouse TDs

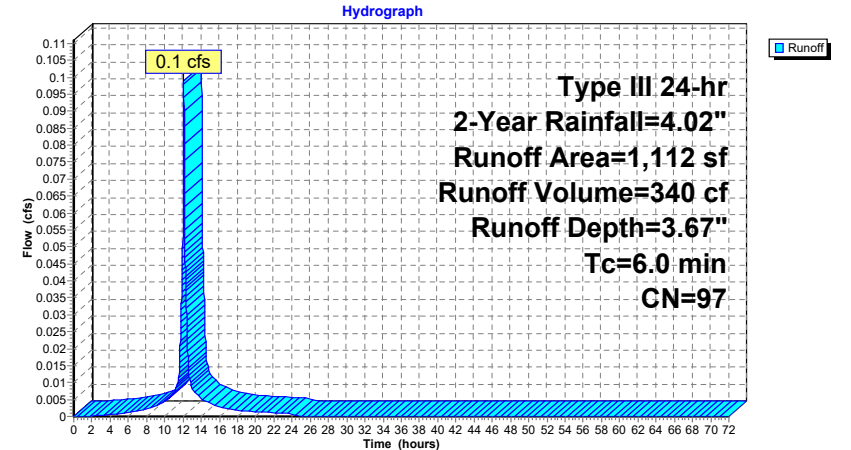
Runoff = 0.1 cfs @ 12.08 hrs, Volume= 340 cf, Depth= 3.67"
Routed to Pond 102P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
1,064	98	Paved parking, HSG C
48	74	>75% Grass cover, Good, HSG C
1,112	97	Weighted Average
48		4.32% Pervious Area
1,064		95.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.2S: Townhouse TDs



Summary for Subcatchment 4.3S: Townhouse TDs

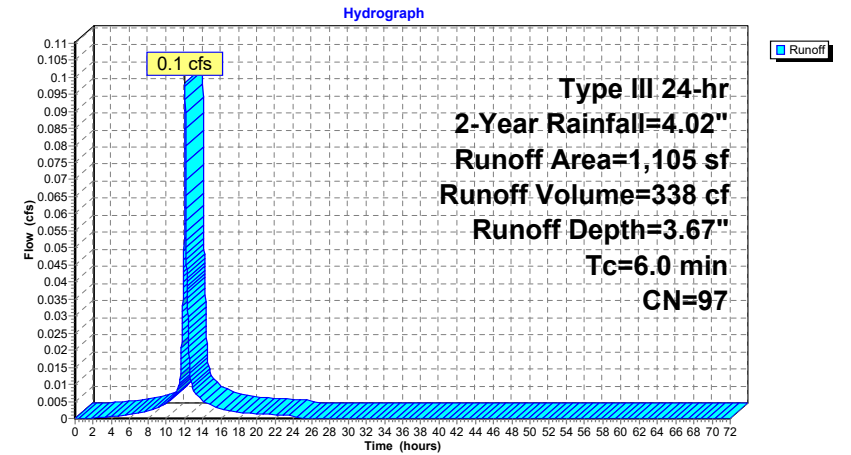
Runoff = 0.1 cfs @ 12.08 hrs, Volume= 338 cf, Depth= 3.67"
Routed to Pond 103P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
1,075	98	Paved parking, HSG C
30	74	>75% Grass cover, Good, HSG C
1,105	97	Weighted Average
30		2.71% Pervious Area
1,075		97.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.3S: Townhouse TDs



Summary for Subcatchment 4.4S: Townhouse TDs

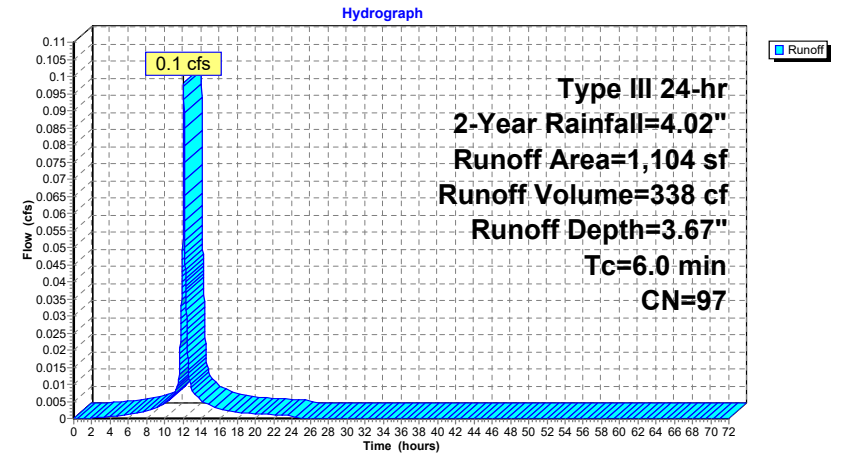
Runoff = 0.1 cfs @ 12.08 hrs, Volume= 338 cf, Depth= 3.67"
Routed to Pond 104P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
1,076	98	Paved parking, HSG C
28	74	>75% Grass cover, Good, HSG C
1,104	97	Weighted Average
28		2.54% Pervious Area
1,076		97.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.4S: Townhouse TDs



Summary for Subcatchment 4.5S: Townhouse TDs

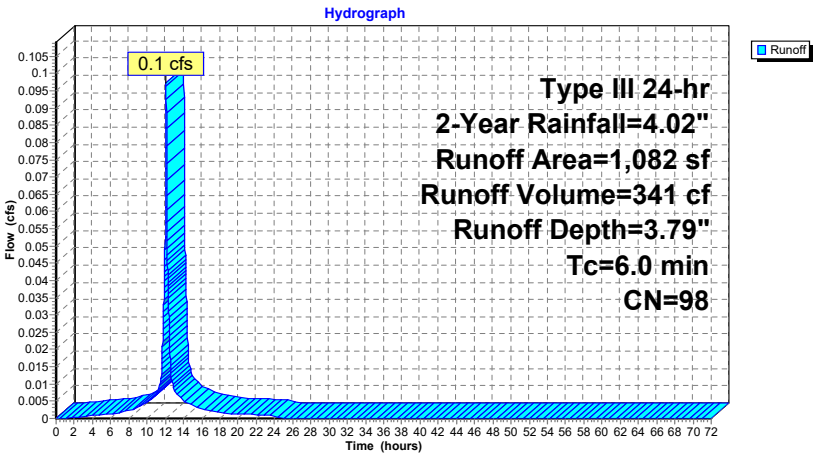
Runoff = 0.1 cfs @ 12.08 hrs, Volume= 341 cf, Depth= 3.79"
Routed to Pond 105P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
1,061	98	Paved parking, HSG C
21	74	>75% Grass cover, Good, HSG C
1,082	98	Weighted Average
21		1.94% Pervious Area
1,061		98.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.5S: Townhouse TDs



Summary for Subcatchment 4.6S: Townhouse TDs

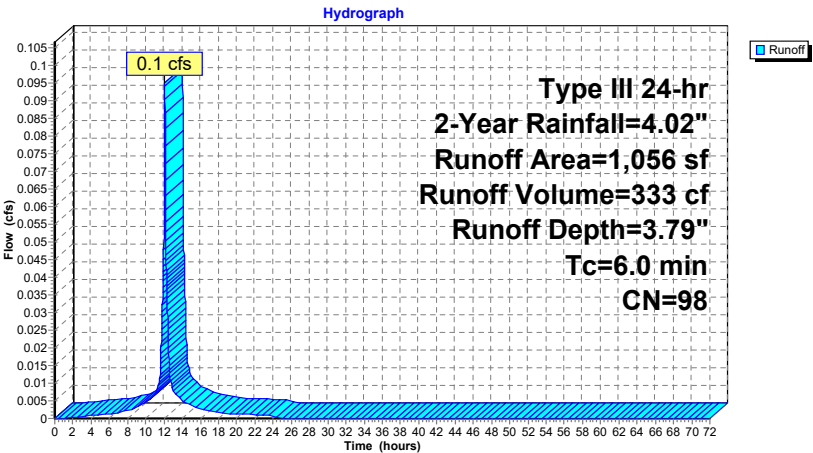
Runoff = 0.1 cfs @ 12.08 hrs, Volume= 333 cf, Depth= 3.79"
Routed to Pond 106P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
1,048	98	Paved parking, HSG C
8	74	>75% Grass cover, Good, HSG C
1,056	98	Weighted Average
8		0.76% Pervious Area
1,048		99.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.6S: Townhouse TDs



Summary for Subcatchment 5S: TD-1

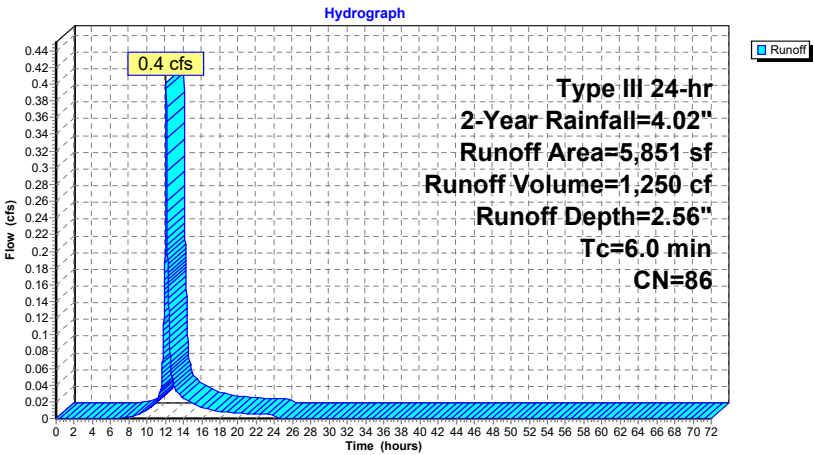
Runoff = 0.4 cfs @ 12.09 hrs, Volume= 1,250 cf, Depth= 2.56"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
3,021	98	Paved parking, HSG C
2,830	74	>75% Grass cover, Good, HSG C
5,851	86	Weighted Average
2,830		48.37% Pervious Area
3,021		51.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 5S: TD-1



Summary for Subcatchment 6.1S: East driveway

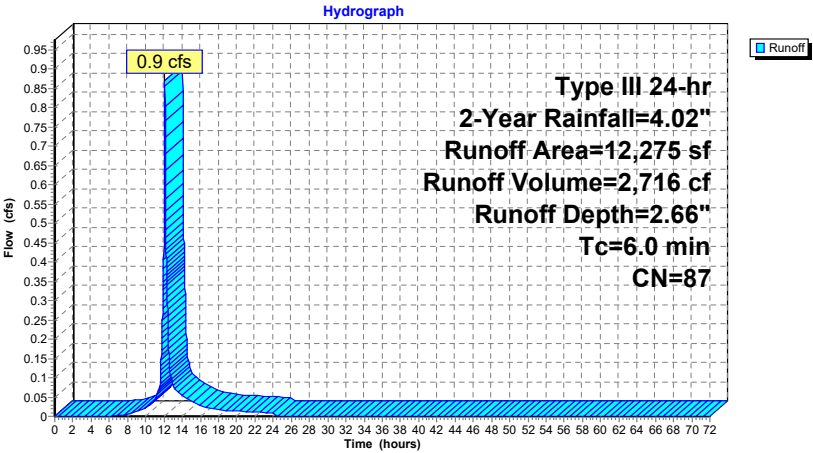
Runoff = 0.9 cfs @ 12.09 hrs, Volume= 2,716 cf, Depth= 2.66"
Routed to Pond 3P : Rain garden

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
5,611	74	>75% Grass cover, Good, HSG C
6,444	98	Paved roads w/curbs & sewers, HSG C
220	89	Gravel roads, HSG C
12,275	87	Weighted Average
5,831		47.50% Pervious Area
6,444		52.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 6.1S: East driveway



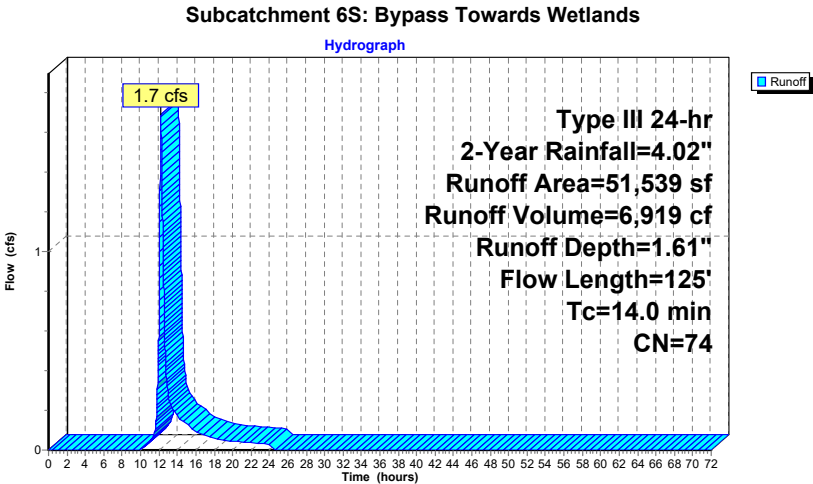
Summary for Subcatchment 6S: Bypass Towards Wetlands

Runoff = 1.7 cfs @ 12.20 hrs, Volume= 6,919 cf, Depth= 1.61"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
4,985	70	Woods, Good, HSG C
46,447	74	>75% Grass cover, Good, HSG C
107	98	Roofs, HSG C
51,539	74	Weighted Average
51,432		99.79% Pervious Area
107		0.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0220	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.23"
2.2	75	0.0133	0.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.0	125	Total			



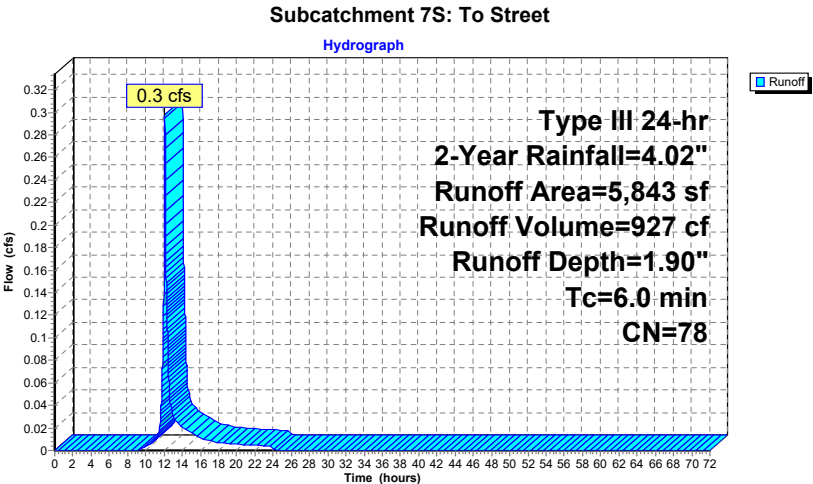
Summary for Subcatchment 7S: To Street

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 927 cf, Depth= 1.90"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=4.02"

Area (sf)	CN	Description
1,056	98	Paved parking, HSG C
4,787	74	>75% Grass cover, Good, HSG C
5,843	78	Weighted Average
4,787		81.93% Pervious Area
1,056		18.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc



Summary for Pond 1P: Underground Infiltration System

Inflow Area = 69,430 sf, 74.25% Impervious, Inflow Depth = 3.16" for 2-Year event
Inflow = 3.8 cfs @ 12.09 hrs, Volume= 18,298 cf
Outflow = 0.2 cfs @ 18.39 hrs, Volume= 18,298 cf, Atten= 96%, Lag= 378.0 min
Discarded = 0.1 cfs @ 9.48 hrs, Volume= 17,316 cf
Primary = 0.1 cfs @ 18.39 hrs, Volume= 982 cf
Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 7.62' @ 18.39 hrs Surf.Area= 8,137 sf Storage= 11,323 cf

Plug-Flow detention time= 1,004.1 min calculated for 18,295 cf (100% of inflow)
Center-of-Mass det. time= 1,003.8 min (1,873.3 - 869.5)

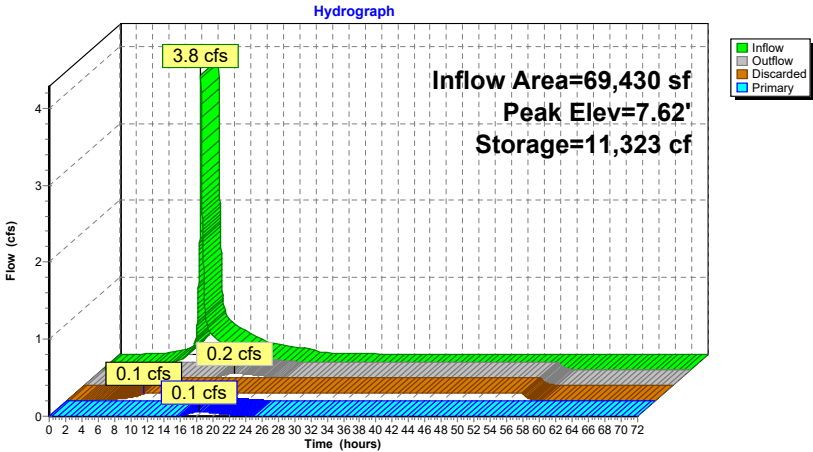
Volume	Invert	Avail.Storage	Storage Description
#1	6.00'	20,994 cf	6.89'W x 14.06'L x 3.00'H StormTrap ST-1 Units (Irregular Shape)x 84 24,412 cf Overall x 86.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	7.50'	15.0" Round Culvert L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.50' / 6.00' S= 0.0079 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.1 cfs @ 9.48 hrs HW=6.03' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.1 cfs @ 18.39 hrs HW=7.62' (Free Discharge)
2=Culvert (Barrel Controls 0.1 cfs @ 1.49 fps)

Pond 1P: Underground Infiltration System



Summary for Pond 2P: Rooftop Detention

Inflow Area = 18,785 sf, 100.00% Impervious, Inflow Depth = 3.79" for 2-Year event
Inflow = 1.7 cfs @ 12.08 hrs, Volume= 5,925 cf
Outflow = 0.2 cfs @ 12.70 hrs, Volume= 5,913 cf, Atten= 89%, Lag= 37.3 min
Primary = 0.2 cfs @ 12.70 hrs, Volume= 5,913 cf
Routed to Pond 1P : Underground Infiltration System

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 57.21' @ 12.70 hrs Surf.Area= 15,000 sf Storage= 3,080 cf

Plug-Flow detention time= 290.4 min calculated for 5,913 cf (100% of inflow)
Center-of-Mass det. time= 289.0 min (1,040.8 - 751.9)

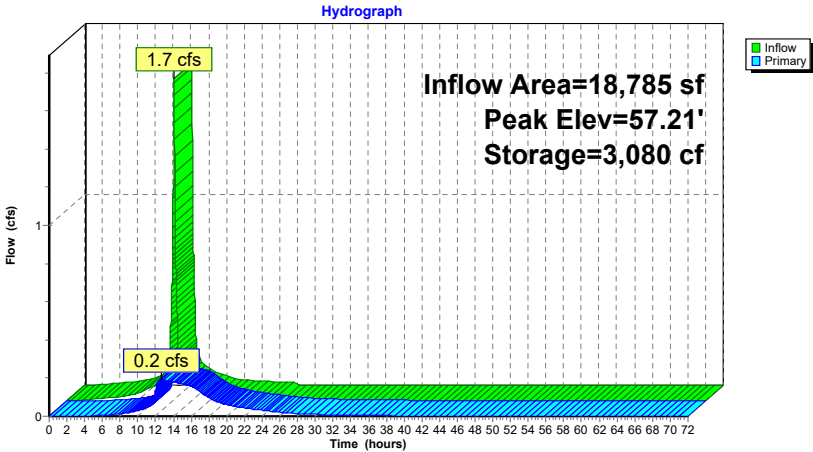
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,500 cf	Rooftop Detention (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	15,000	0	0
57.70	15,000	10,500	10,500

Device	Routing	Invert	Outlet Devices
#1	Primary	8.02'	12.0" Round Roof Drain L= 16.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 8.02' / 7.70' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	57.00'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.2 cfs @ 12.70 hrs HW=57.21' (Free Discharge)
1=Roof Drain (Passes 0.2 cfs of 23.3 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.2 cfs @ 2.18 fps)

Pond 2P: Rooftop Detention



Summary for Pond 3P: Rain garden

Inflow Area = 12,275 sf, 52.50% Impervious, Inflow Depth = 2.66" for 2-Year event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 2,716 cf
Outflow = 0.9 cfs @ 12.09 hrs, Volume= 2,716 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.0 cfs @ 12.09 hrs, Volume= 411 cf
Primary = 0.9 cfs @ 12.09 hrs, Volume= 2,305 cf
Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 6.37' @ 12.09 hrs Surf.Area= 384 sf Storage= 196 cf

Plug-Flow detention time= 80.6 min calculated for 2,715 cf (100% of inflow)
Center-of-Mass det. time= 80.8 min (890.3 - 809.6)

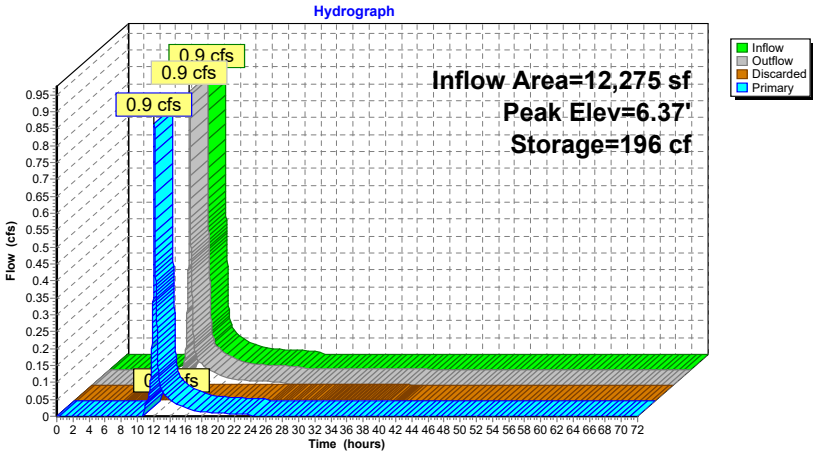
Volume	Invert	Avail.Storage	Storage Description			
#1	5.60'	253 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
5.60	125	46.0	0	0	125	
6.00	276	66.0	78	78	305	
6.30	350	73.0	94	172	385	
6.50	460	87.0	81	253	564	

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.60'	0.520 in/hr Exfiltration over Surface area
#2	Primary	6.30'	22.0' long x 5.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
			2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
			2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.0 cfs @ 12.09 hrs HW=6.37' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.9 cfs @ 12.09 hrs HW=6.37' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.9 cfs @ 0.60 fps)

Pond 3P: Rain garden



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Type III 24-hr 2-Year Rainfall=4.02"

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Summary for Pond 102P:

Inflow Area = 1,112 sf, 95.68% Impervious, Inflow Depth = 3.67" for 2-Year event
 Inflow = 0.1 cfs @ 12.08 hrs, Volume= 340 cf
 Outflow = 0.0 cfs @ 10.03 hrs, Volume= 340 cf, Atten= 96%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 10.03 hrs, Volume= 340 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 6.71' @ 15.36 hrs Surf.Area= 294 sf Storage= 189 cf

Plug-Flow detention time= 481.9 min calculated for 340 cf (100% of inflow)

Center-of-Mass det. time= 481.8 min (1,242.3 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 10.03 hrs HW=6.04' (Free Discharge)↳ **1=Exfiltration** (Exfiltration Controls 0.0 cfs)**Primary OutFlow** Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)↳ **2=Orifice/Grate** (Controls 0.0 cfs)**2340702-PR**

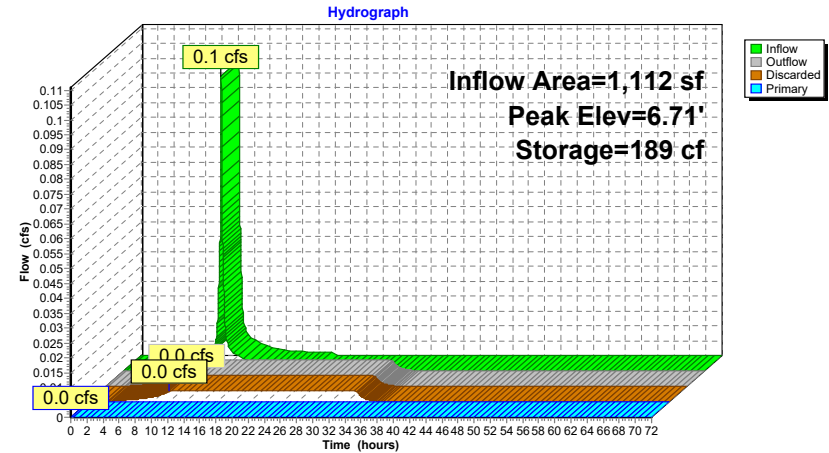
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Type III 24-hr 2-Year Rainfall=4.02"

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Pond 102P:

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Type III 24-hr 2-Year Rainfall=4.02"

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Summary for Pond 103P:

Inflow Area = 1,105 sf, 97.29% Impervious, Inflow Depth = 3.67" for 2-Year event
 Inflow = 0.1 cfs @ 12.08 hrs, Volume= 338 cf
 Outflow = 0.0 cfs @ 10.05 hrs, Volume= 338 cf, Atten= 96%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 10.05 hrs, Volume= 338 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 6.71' @ 15.34 hrs Surf.Area= 294 sf Storage= 187 cf

Plug-Flow detention time= 477.7 min calculated for 338 cf (100% of inflow)
 Center-of-Mass det. time= 477.7 min (1,238.2 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 10.05 hrs HW=6.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)

2=Orifice/Grate (Controls 0.0 cfs)

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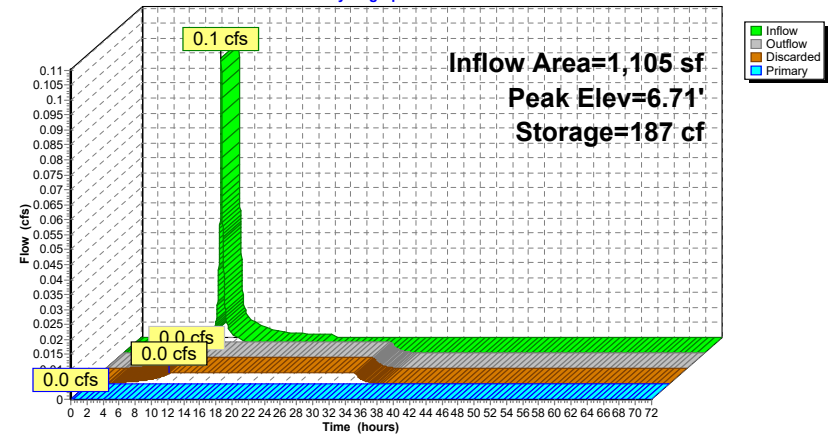
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Pond 103P:**Hydrograph**

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Type III 24-hr 2-Year Rainfall=4.02"

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Summary for Pond 104P:

Inflow Area = 1,104 sf, 97.46% Impervious, Inflow Depth = 3.67" for 2-Year event
 Inflow = 0.1 cfs @ 12.08 hrs, Volume= 338 cf
 Outflow = 0.0 cfs @ 10.05 hrs, Volume= 338 cf, Atten= 96%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 10.05 hrs, Volume= 338 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 6.71' @ 15.34 hrs Surf.Area= 294 sf Storage= 187 cf

Plug-Flow detention time= 477.1 min calculated for 338 cf (100% of inflow)
 Center-of-Mass det. time= 477.1 min (1,237.6 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97"L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97"L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 10.05 hrs HW=6.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)

2=Orifice/Grate (Controls 0.0 cfs)

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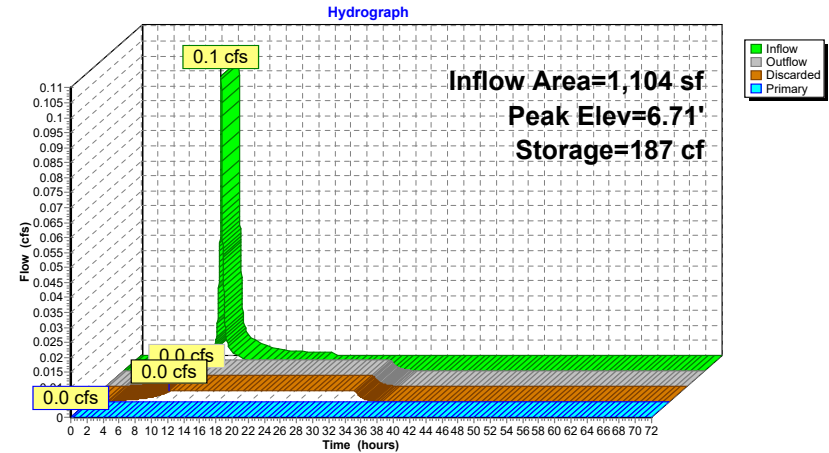
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Pond 104P:

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Summary for Pond 105P:

Inflow Area = 1,082 sf, 98.06% Impervious, Inflow Depth = 3.79" for 2-Year event
 Inflow = 0.1 cfs @ 12.08 hrs, Volume= 341 cf
 Outflow = 0.0 cfs @ 9.90 hrs, Volume= 341 cf, Atten= 96%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 9.90 hrs, Volume= 341 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 6.70' @ 15.29 hrs Surf.Area= 294 sf Storage= 186 cf

Plug-Flow detention time= 467.2 min calculated for 341 cf (100% of inflow)
 Center-of-Mass det. time= 467.2 min (1,219.1 - 751.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 9.90 hrs HW=6.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)

2=Orifice/Grate (Controls 0.0 cfs)

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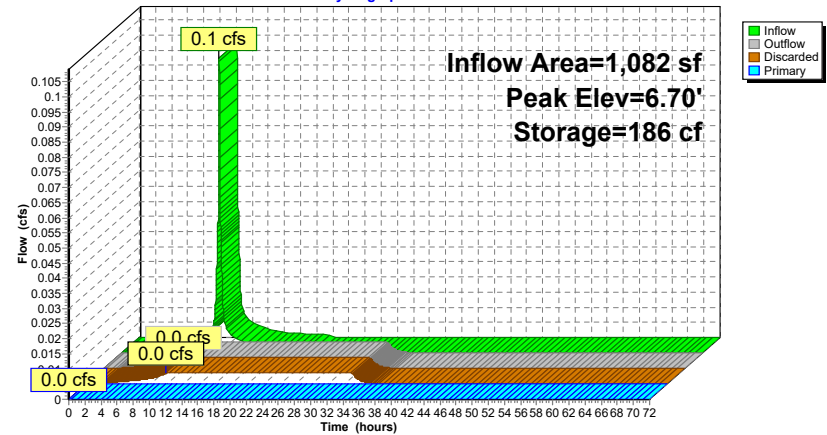
Type III 24-hr 2-Year Rainfall=4.02"

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Pond 105P:

Hydrograph



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Summary for Pond 106P:

Inflow Area = 1,056 sf, 99.24% Impervious, Inflow Depth = 3.79" for 2-Year event
 Inflow = 0.1 cfs @ 12.08 hrs, Volume= 333 cf
 Outflow = 0.0 cfs @ 9.98 hrs, Volume= 333 cf, Atten= 96%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 9.98 hrs, Volume= 333 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 6.68' @ 15.21 hrs Surf.Area= 294 sf Storage= 180 cf

Plug-Flow detention time= 451.9 min calculated for 333 cf (100% of inflow)
 Center-of-Mass det. time= 451.9 min (1,203.8 - 751.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 9.98 hrs HW=6.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)

2=Orifice/Grate (Controls 0.0 cfs)

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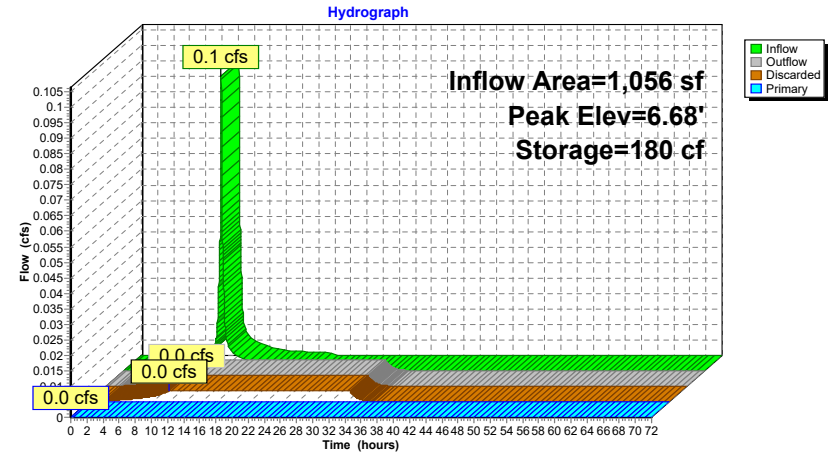
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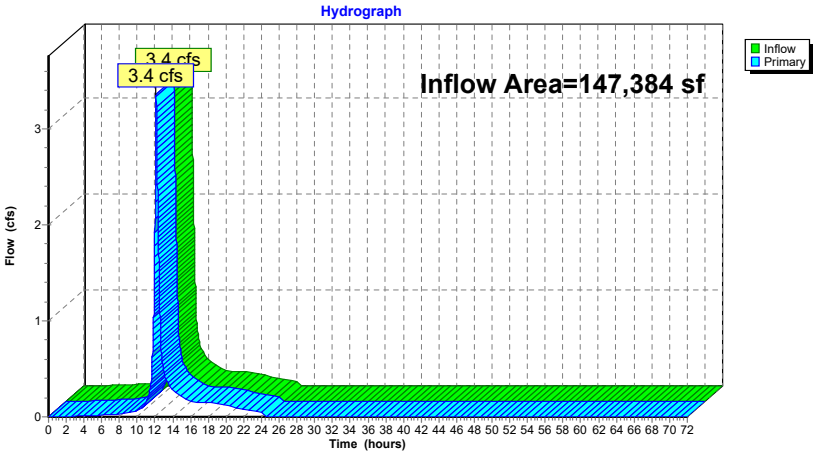
Pond 106P:

Summary for Link 1L: Towards Wetlands

Inflow Area = 147,384 sf, 49.02% Impervious, Inflow Depth = 1.19" for 2-Year event
Inflow = 3.4 cfs @ 12.11 hrs, Volume= 14,666 cf
Primary = 3.4 cfs @ 12.11 hrs, Volume= 14,666 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: Towards Wetlands

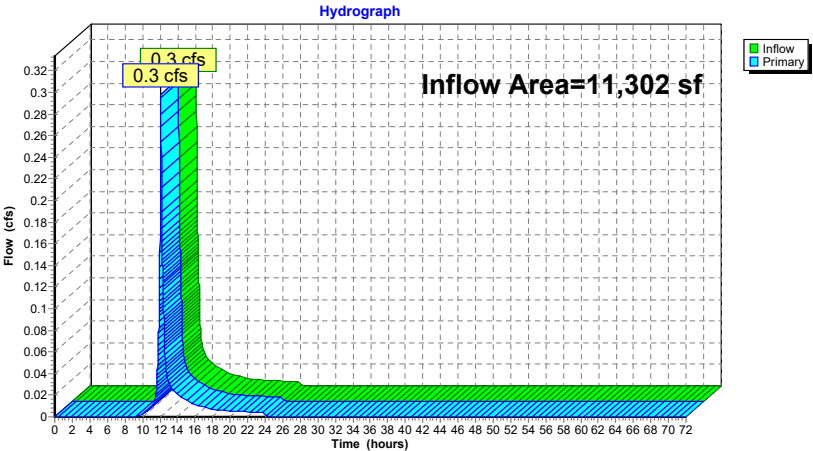


Summary for Link 2L: Towards Street

Inflow Area = 11,302 sf, 56.45% Impervious, Inflow Depth = 0.98" for 2-Year event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 927 cf
Primary = 0.3 cfs @ 12.09 hrs, Volume= 927 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 2L: Towards Street

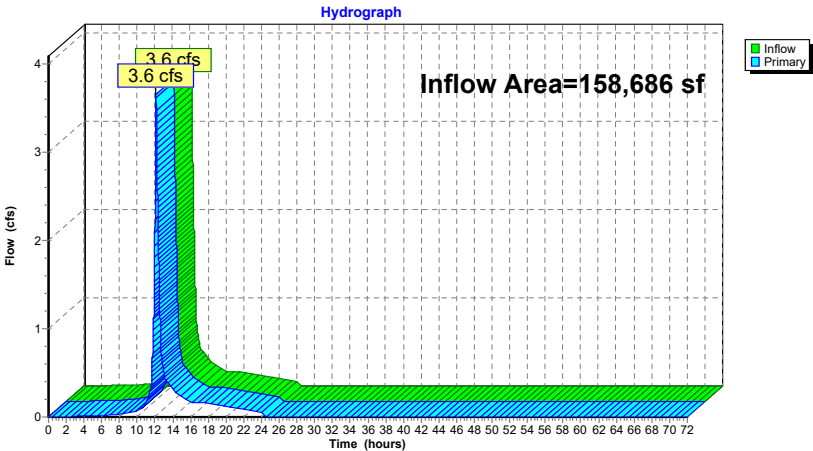


Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 49.55% Impervious, Inflow Depth = 1.18" for 2-Year event
Inflow = 3.6 cfs @ 12.11 hrs, Volume= 15,592 cf
Primary = 3.6 cfs @ 12.11 hrs, Volume= 15,592 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 100L: Total Flows



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1	Runoff Area=22,742 sf 72.16% Impervious Runoff Depth=5.35" Tc=6.0 min CN=91 Runoff=3.1 cfs 10,138 cf
Subcatchment 2.1S: Building	Runoff Area=14,140 sf 100.00% Impervious Runoff Depth=6.16" Tc=6.0 min CN=98 Runoff=2.0 cfs 7,260 cf
Subcatchment 2S: Building Roof	Runoff Area=18,785 sf 100.00% Impervious Runoff Depth=6.16" Tc=6.0 min CN=98 Runoff=2.7 cfs 9,645 cf
Subcatchment 3.1S: Backyard ADs	Runoff Area=8,985 sf 3.03% Impervious Runoff Depth=3.63" Flow Length=147' Tc=10.3 min CN=75 Runoff=0.8 cfs 2,715 cf
Subcatchment 3S: Townhouse Roofs	Runoff Area=13,067 sf 100.00% Impervious Runoff Depth=6.16" Tc=6.0 min CN=98 Runoff=1.9 cfs 6,709 cf
Subcatchment 4.2S: Townhouse TDs	Runoff Area=1,112 sf 95.68% Impervious Runoff Depth=6.04" Tc=6.0 min CN=97 Runoff=0.2 cfs 560 cf
Subcatchment 4.3S: Townhouse TDs	Runoff Area=1,105 sf 97.29% Impervious Runoff Depth=6.04" Tc=6.0 min CN=97 Runoff=0.2 cfs 556 cf
Subcatchment 4.4S: Townhouse TDs	Runoff Area=1,104 sf 97.46% Impervious Runoff Depth=6.04" Tc=6.0 min CN=97 Runoff=0.2 cfs 556 cf
Subcatchment 4.5S: Townhouse TDs	Runoff Area=1,082 sf 98.06% Impervious Runoff Depth=6.16" Tc=6.0 min CN=98 Runoff=0.2 cfs 556 cf
Subcatchment 4.6S: Townhouse TDs	Runoff Area=1,056 sf 99.24% Impervious Runoff Depth=6.16" Tc=6.0 min CN=98 Runoff=0.2 cfs 542 cf
Subcatchment 5S: TD-1	Runoff Area=5,851 sf 51.63% Impervious Runoff Depth=4.79" Tc=6.0 min CN=86 Runoff=0.7 cfs 2,336 cf
Subcatchment 6.1S: East driveway	Runoff Area=12,275 sf 52.50% Impervious Runoff Depth=4.90" Tc=6.0 min CN=87 Runoff=1.6 cfs 5,013 cf
Subcatchment 6S: Bypass Towards	Runoff Area=51,539 sf 0.21% Impervious Runoff Depth=3.52" Flow Length=125' Tc=14.0 min CN=74 Runoff=3.8 cfs 15,135 cf
Subcatchment 7S: To Street	Runoff Area=5,843 sf 18.07% Impervious Runoff Depth=3.93" Tc=6.0 min CN=78 Runoff=0.6 cfs 1,916 cf
Pond 1P: Underground Infiltration System	Peak Elev=7.90' Storage=13,318 cf Inflow=6.5 cfs 31,528 cf Discarded=0.1 cfs 18,710 cf Primary=0.7 cfs 12,817 cf Outflow=0.8 cfs 31,527 cf
Pond 2P: Rooftop Detention	Peak Elev=57.34' Storage=5,026 cf Inflow=2.7 cfs 9,645 cf Outflow=0.2 cfs 9,631 cf

Pond 3P: Rain garden	Peak Elev=6.40' Storage=208 cf Inflow=1.6 cfs 5,013 cf Discarded=0.0 cfs 442 cf Primary=1.6 cfs 4,571 cf Outflow=1.6 cfs 5,013 cf
Pond 102P:	Peak Elev=7.36' Storage=359 cf Inflow=0.2 cfs 560 cf Discarded=0.0 cfs 560 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 560 cf
Pond 103P:	Peak Elev=7.35' Storage=356 cf Inflow=0.2 cfs 556 cf Discarded=0.0 cfs 556 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 556 cf
Pond 104P:	Peak Elev=7.35' Storage=356 cf Inflow=0.2 cfs 556 cf Discarded=0.0 cfs 556 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 556 cf
Pond 105P:	Peak Elev=7.33' Storage=351 cf Inflow=0.2 cfs 556 cf Discarded=0.0 cfs 556 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 556 cf
Pond 106P:	Peak Elev=7.29' Storage=340 cf Inflow=0.2 cfs 542 cf Discarded=0.0 cfs 542 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 542 cf
Link 1L: Towards Wetlands	Inflow=6.5 cfs 39,784 cf Primary=6.5 cfs 39,784 cf
Link 2L: Towards Street	Inflow=0.6 cfs 1,916 cf Primary=0.6 cfs 1,916 cf
Link 100L: Total Flows	Inflow=7.1 cfs 41,700 cf Primary=7.1 cfs 41,700 cf

Total Runoff Area = 158,686 sf Runoff Volume = 63,637 cf Average Runoff Depth = 4.81"
50.45% Pervious = 80,060 sf 49.55% Impervious = 78,626 sf

Summary for Subcatchment 1S: CB-1

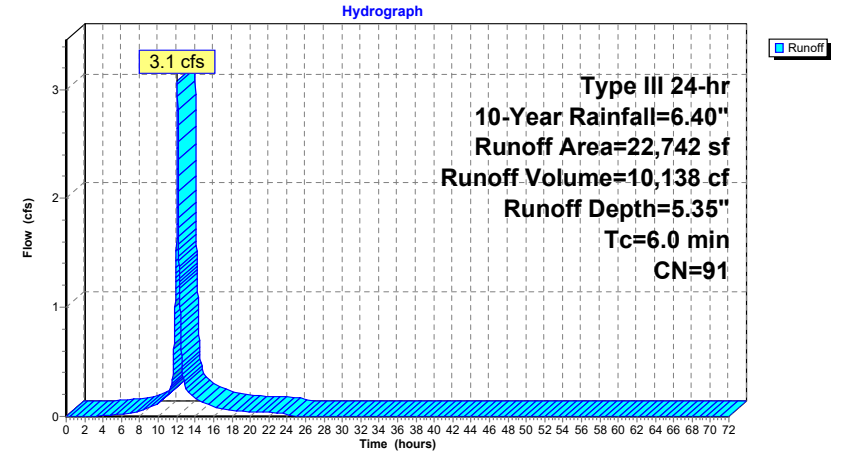
Runoff = 3.1 cfs @ 12.08 hrs, Volume= 10,138 cf, Depth= 5.35"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
16,410	98	Paved parking, HSG C
6,332	74	>75% Grass cover, Good, HSG C
22,742	91	Weighted Average
6,332		27.84% Pervious Area
16,410		72.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 1S: CB-1



Summary for Subcatchment 2.1S: Building Roof-Southeast

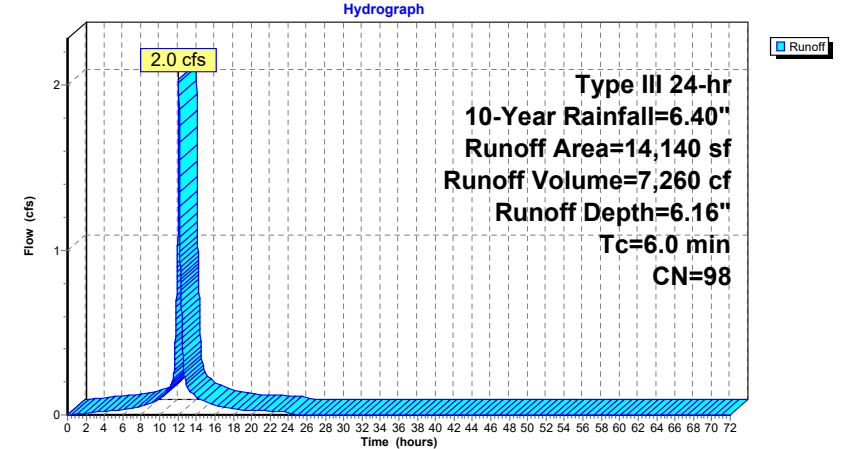
Runoff = 2.0 cfs @ 12.08 hrs, Volume= 7,260 cf, Depth= 6.16"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
14,140	98	Roofs, HSG C
14,140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2.1S: Building Roof-Southeast



Summary for Subcatchment 2S: Building Roof

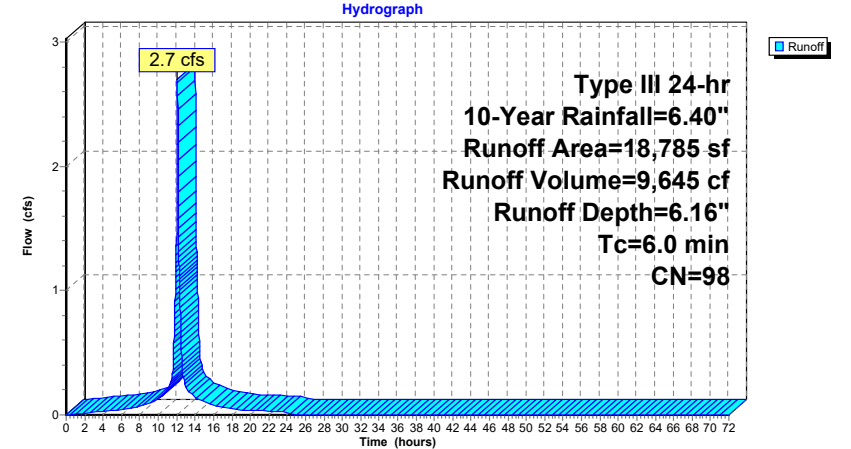
Runoff = 2.7 cfs @ 12.08 hrs, Volume= 9,645 cf, Depth= 6.16"
Routed to Pond 2P : Rooftop Detention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
18,785	98	Roofs, HSG C
18,785		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2S: Building Roof



Summary for Subcatchment 3.1S: Backyard ADs

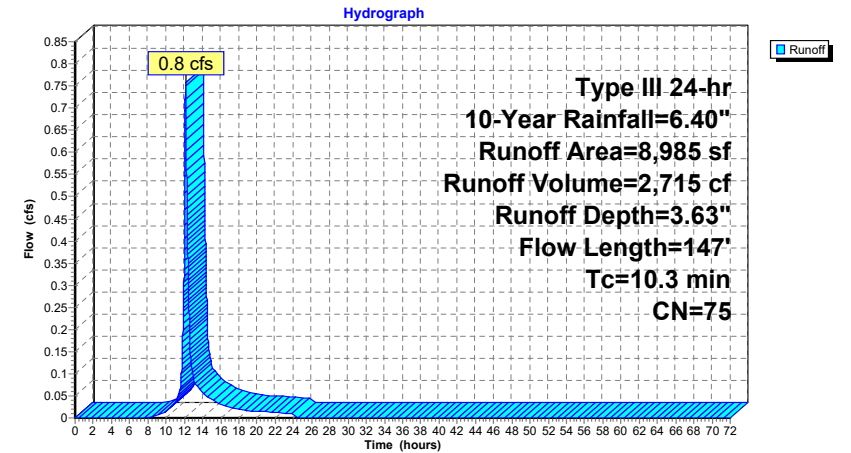
Runoff = 0.8 cfs @ 12.14 hrs, Volume= 2,715 cf, Depth= 3.63"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
272	98	Unconnected pavement, HSG C
8,302	74	>75% Grass cover, Good, HSG C
411	89	Gravel sidewalk, HSG C
8,985	75	Weighted Average
8,713		96.97% Pervious Area
272		3.03% Impervious Area
272		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0142	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.23"
0.9	97	0.0154	1.86		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
10.3	147	Total			

Subcatchment 3.1S: Backyard ADs



Summary for Subcatchment 3S: Townhouse Roofs

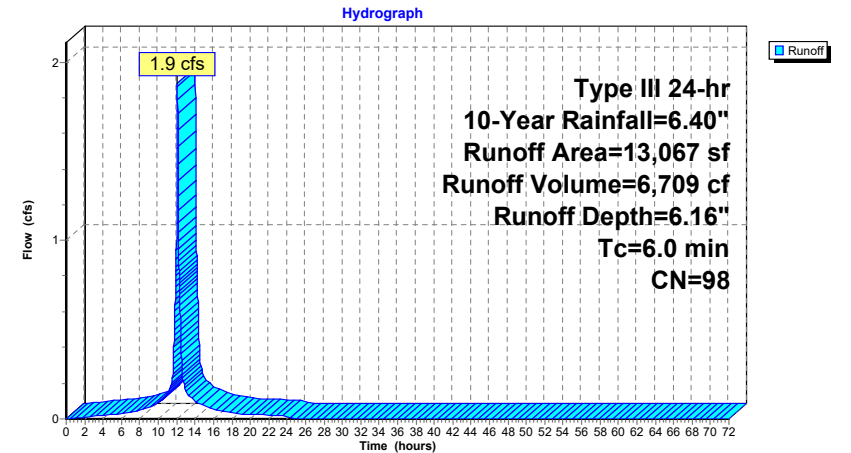
Runoff = 1.9 cfs @ 12.08 hrs, Volume= 6,709 cf, Depth= 6.16"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
13,067	98	Roofs, HSG C
13,067		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 3S: Townhouse Roofs



Summary for Subcatchment 4.2S: Townhouse TDs

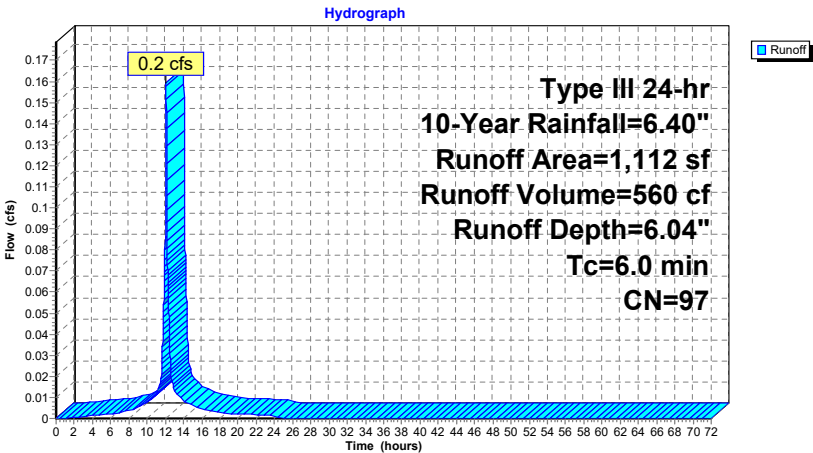
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 560 cf, Depth= 6.04"
Routed to Pond 102P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
1,064	98	Paved parking, HSG C
48	74	>75% Grass cover, Good, HSG C
1,112	97	Weighted Average
48		4.32% Pervious Area
1,064		95.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.2S: Townhouse TDs



Summary for Subcatchment 4.3S: Townhouse TDs

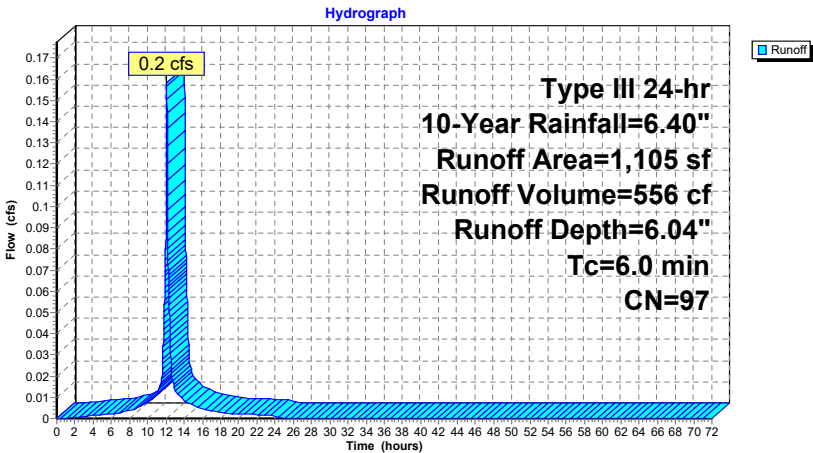
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 556 cf, Depth= 6.04"
Routed to Pond 103P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
1,075	98	Paved parking, HSG C
30	74	>75% Grass cover, Good, HSG C
1,105	97	Weighted Average
30		2.71% Pervious Area
1,075		97.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.3S: Townhouse TDs



Summary for Subcatchment 4.4S: Townhouse TDs

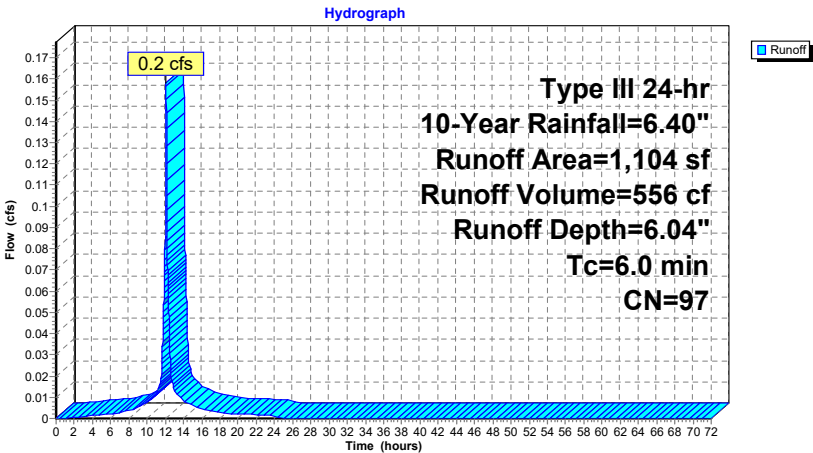
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 556 cf, Depth= 6.04"
Routed to Pond 104P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
1,076	98	Paved parking, HSG C
28	74	>75% Grass cover, Good, HSG C
1,104	97	Weighted Average
28		2.54% Pervious Area
1,076		97.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.4S: Townhouse TDs



Summary for Subcatchment 4.5S: Townhouse TDs

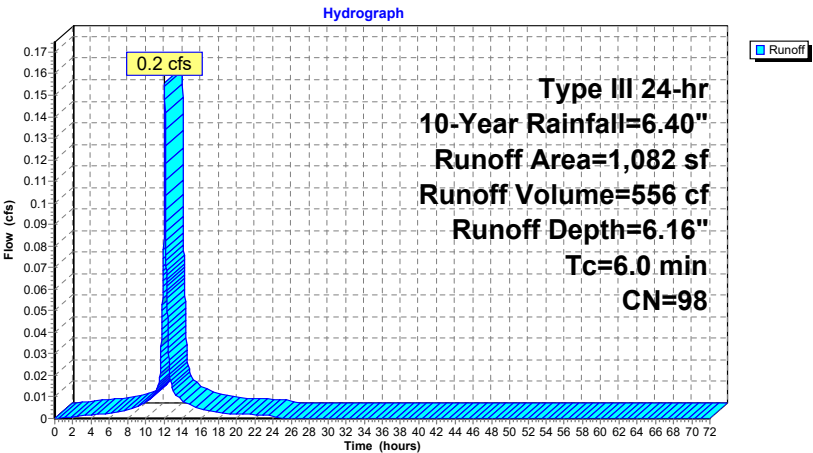
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 556 cf, Depth= 6.16"
Routed to Pond 105P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
1,061	98	Paved parking, HSG C
21	74	>75% Grass cover, Good, HSG C
1,082	98	Weighted Average
21		1.94% Pervious Area
1,061		98.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.5S: Townhouse TDs



Summary for Subcatchment 4.6S: Townhouse TDs

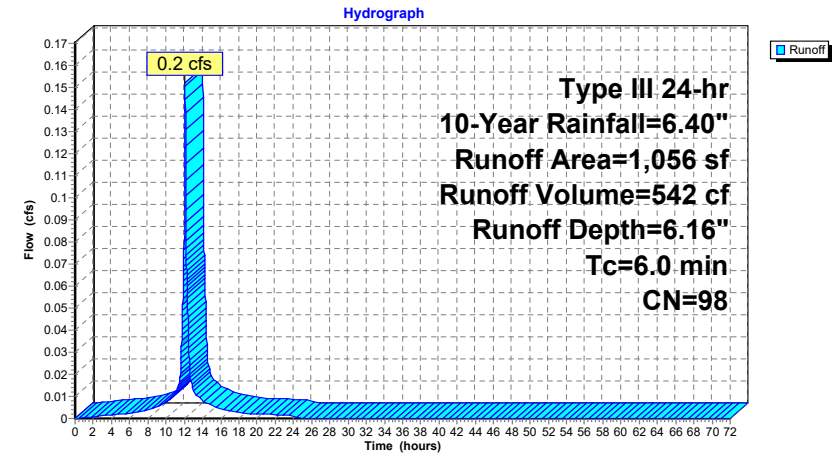
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 542 cf, Depth= 6.16"
Routed to Pond 106P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
1,048	98	Paved parking, HSG C
8	74	>75% Grass cover, Good, HSG C
1,056	98	Weighted Average
8		0.76% Pervious Area
1,048		99.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.6S: Townhouse TDs



Summary for Subcatchment 5S: TD-1

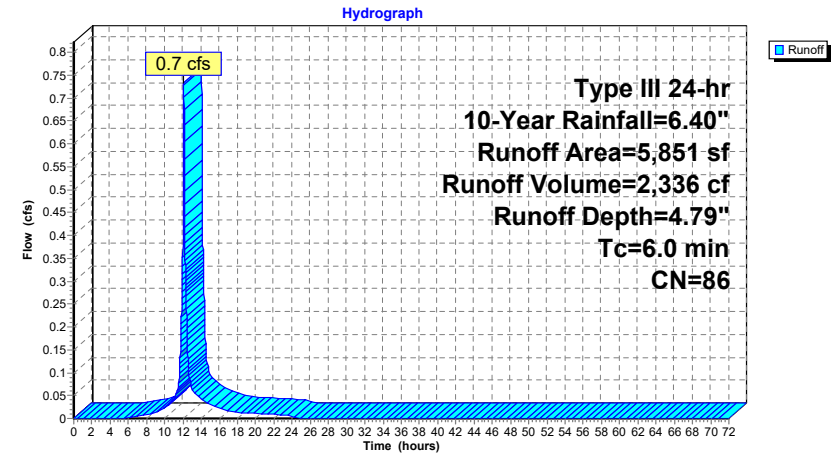
Runoff = 0.7 cfs @ 12.09 hrs, Volume= 2,336 cf, Depth= 4.79"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
3,021	98	Paved parking, HSG C
2,830	74	>75% Grass cover, Good, HSG C
5,851	86	Weighted Average
2,830		48.37% Pervious Area
3,021		51.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 5S: TD-1



Summary for Subcatchment 6.1S: East driveway

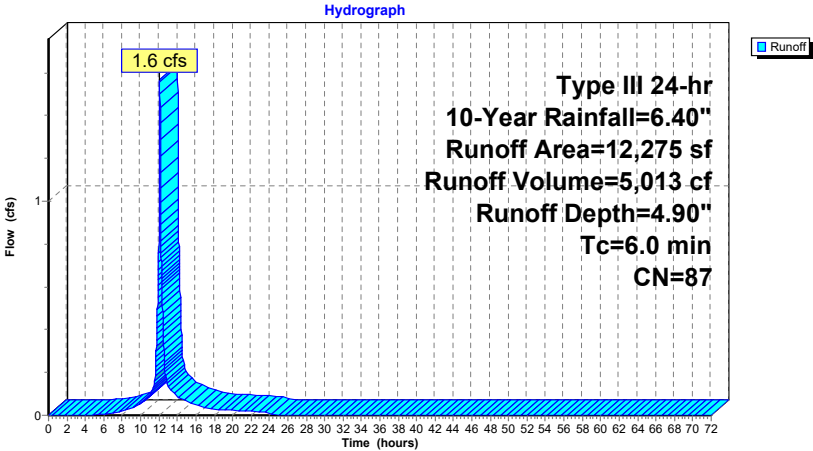
Runoff = 1.6 cfs @ 12.09 hrs, Volume= 5,013 cf, Depth= 4.90"
Routed to Pond 3P : Rain garden

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
5,611	74	>75% Grass cover, Good, HSG C
6,444	98	Paved roads w/curbs & sewers, HSG C
220	89	Gravel roads, HSG C
12,275	87	Weighted Average
5,831		47.50% Pervious Area
6,444		52.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 6.1S: East driveway



Summary for Subcatchment 6S: Bypass Towards Wetlands

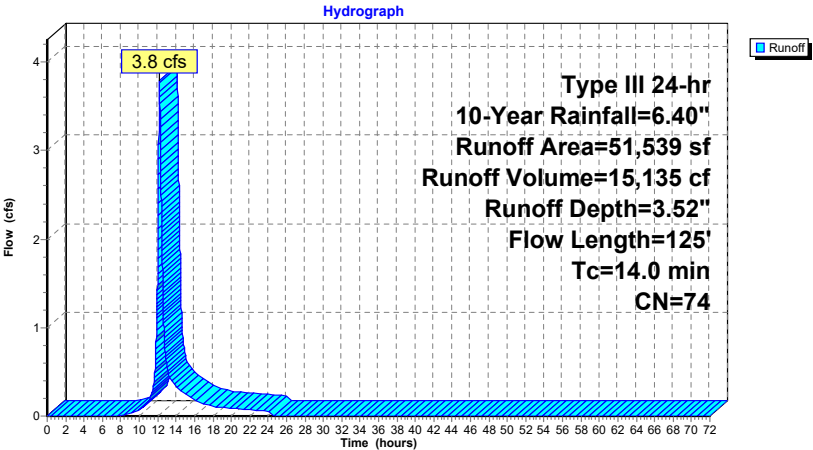
Runoff = 3.8 cfs @ 12.19 hrs, Volume= 15,135 cf, Depth= 3.52"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
4,985	70	Woods, Good, HSG C
46,447	74	>75% Grass cover, Good, HSG C
107	98	Roofs, HSG C
51,539	74	Weighted Average
51,432		99.79% Pervious Area
107		0.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0220	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.23"
2.2	75	0.0133	0.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.0	125	Total			

Subcatchment 6S: Bypass Towards Wetlands



Summary for Subcatchment 7S: To Street

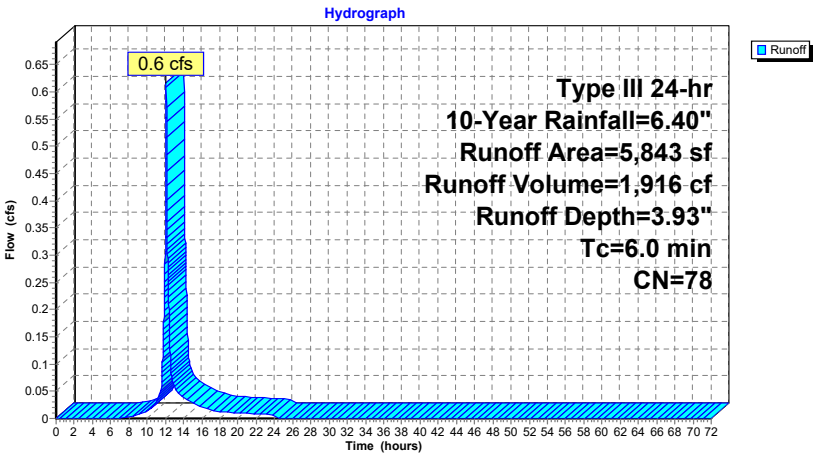
Runoff = 0.6 cfs @ 12.09 hrs, Volume= 1,916 cf, Depth= 3.93"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=6.40"

Area (sf)	CN	Description
1,056	98	Paved parking, HSG C
4,787	74	>75% Grass cover, Good, HSG C
5,843	78	Weighted Average
4,787		81.93% Pervious Area
1,056		18.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 7S: To Street



Summary for Pond 1P: Underground Infiltration System

Inflow Area = 69,430 sf, 74.25% Impervious, Inflow Depth = 5.45" for 10-Year event
Inflow = 6.5 cfs @ 12.09 hrs, Volume= 31,528 cf
Outflow = 0.8 cfs @ 13.03 hrs, Volume= 31,527 cf, Atten= 88%, Lag= 56.7 min
Discarded = 0.1 cfs @ 7.72 hrs, Volume= 18,710 cf
Primary = 0.7 cfs @ 13.03 hrs, Volume= 12,817 cf
Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 7.90' @ 13.03 hrs Surf.Area= 8,137 sf Storage= 13,318 cf

Plug-Flow detention time= 676.6 min calculated for 31,527 cf (100% of inflow)
Center-of-Mass det. time= 676.5 min (1,535.2 - 858.7)

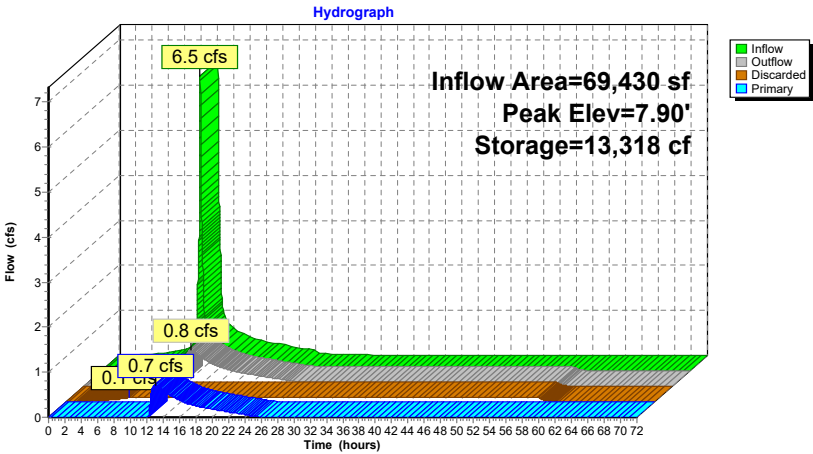
Volume	Invert	Avail.Storage	Storage Description
#1	6.00'	20,994 cf	6.89'W x 14.06'L x 3.00'H StormTrap ST-1 Units (Irregular Shape)x 84 24,412 cf Overall x 86.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	7.50'	15.0" Round Culvert L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.50' / 6.00' S= 0.0079 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.1 cfs @ 7.72 hrs HW=6.03' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.7 cfs @ 13.03 hrs HW=7.90' (Free Discharge)
2=Culvert (Barrel Controls 0.7 cfs @ 3.08 fps)

Pond 1P: Underground Infiltration System



Summary for Pond 2P: Rooftop Detention

Inflow Area = 18,785 sf, 100.00% Impervious, Inflow Depth = 6.16" for 10-Year event
Inflow = 2.7 cfs @ 12.08 hrs, Volume= 9,645 cf
Outflow = 0.2 cfs @ 12.93 hrs, Volume= 9,631 cf, Atten= 91%, Lag= 51.1 min
Primary = 0.2 cfs @ 12.93 hrs, Volume= 9,631 cf
Routed to Pond 1P : Underground Infiltration System

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 57.34' @ 12.93 hrs Surf.Area= 15,000 sf Storage= 5,026 cf

Plug-Flow detention time= 302.8 min calculated for 9,629 cf (100% of inflow)
Center-of-Mass det. time= 302.1 min (1,046.3 - 744.2)

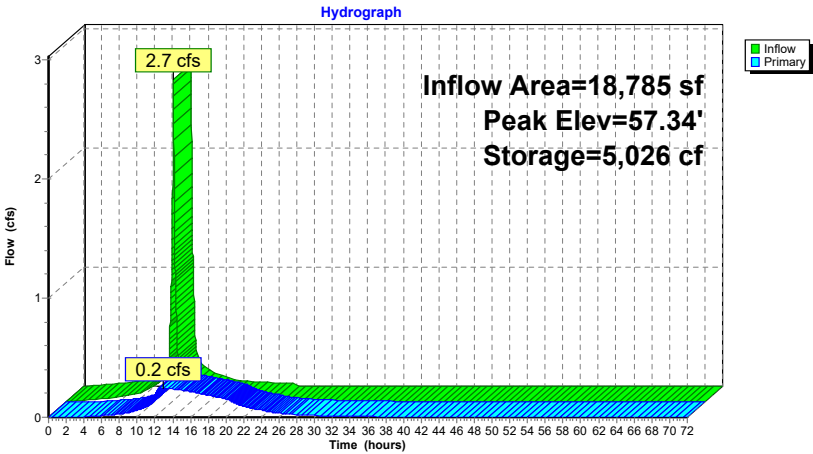
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,500 cf	Rooftop Detention (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	15,000	0	0
57.70	15,000	10,500	10,500

Device	Routing	Invert	Outlet Devices
#1	Primary	8.02'	12.0" Round Roof Drain L= 16.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 8.02' / 7.70' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	57.00'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.2 cfs @ 12.93 hrs HW=57.34' (Free Discharge)
1=Roof Drain (Passes 0.2 cfs of 23.3 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.2 cfs @ 2.79 fps)

Pond 2P: Rooftop Detention



Summary for Pond 3P: Rain garden

Inflow Area = 12,275 sf, 52.50% Impervious, Inflow Depth = 4.90" for 10-Year event
Inflow = 1.6 cfs @ 12.09 hrs, Volume= 5,013 cf
Outflow = 1.6 cfs @ 12.09 hrs, Volume= 5,013 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.0 cfs @ 12.09 hrs, Volume= 442 cf
Primary = 1.6 cfs @ 12.09 hrs, Volume= 4,571 cf
Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 6.40' @ 12.09 hrs Surf.Area= 402 sf Storage= 208 cf

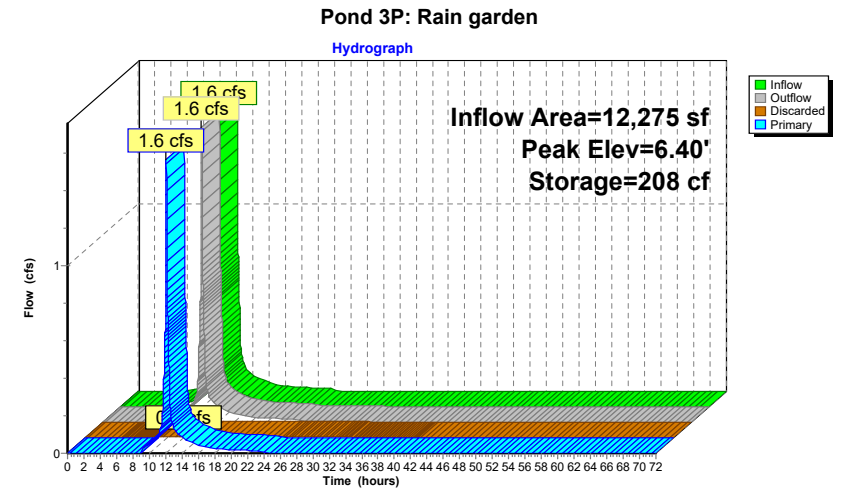
Plug-Flow detention time= 47.7 min calculated for 5,012 cf (100% of inflow)
Center-of-Mass det. time= 47.9 min (840.3 - 792.4)

Volume	Invert	Avail.Storage	Storage Description			
#1	5.60'	253 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
5.60	125	46.0	0	0	125	
6.00	276	66.0	78	78	305	
6.30	350	73.0	94	172	385	
6.50	460	87.0	81	253	564	

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.60'	0.520 in/hr Exfiltration over Surface area
#2	Primary	6.30'	22.0' long x 5.0' breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00			
2.50 3.00 3.50 4.00 4.50 5.00 5.50			
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65			
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88			

Discarded OutFlow Max=0.0 cfs @ 12.09 hrs HW=6.40' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=1.6 cfs @ 12.09 hrs HW=6.40' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 1.6 cfs @ 0.73 fps)



Summary for Pond 102P:

Inflow Area = 1,112 sf, 95.68% Impervious, Inflow Depth = 6.04" for 10-Year event

Inflow = 0.2 cfs @ 12.08 hrs, Volume= 560 cf

Outflow = 0.0 cfs @ 8.46 hrs, Volume= 560 cf, Atten= 98%, Lag= 0.0 min

Discarded = 0.0 cfs @ 8.46 hrs, Volume= 560 cf

Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 7.36' @ 16.99 hrs Surf.Area= 294 sf Storage= 359 cf

Plug-Flow detention time= 898.0 min calculated for 560 cf (100% of inflow)

Center-of-Mass det. time= 897.9 min (1,648.9 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 8.46 hrs HW=6.04' (Free Discharge)

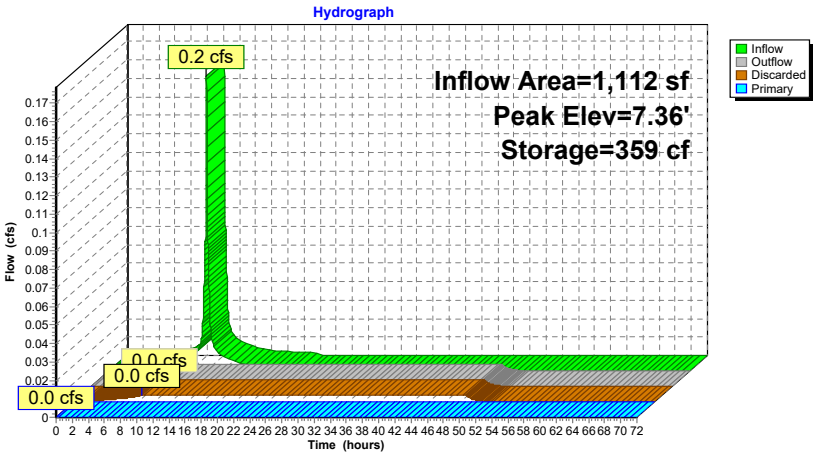
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)

2=Orifice/Grate (Controls 0.0 cfs)

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Pond 102P:



Summary for Pond 103P:

Inflow Area = 1,105 sf, 97.29% Impervious, Inflow Depth = 6.04" for 10-Year event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 556 cf
Outflow = 0.0 cfs @ 8.48 hrs, Volume= 556 cf, Atten= 98%, Lag= 0.0 min
Discarded = 0.0 cfs @ 8.48 hrs, Volume= 556 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 7.35' @ 16.96 hrs Surf.Area= 294 sf Storage= 356 cf

Plug-Flow detention time= 890.5 min calculated for 556 cf (100% of inflow)
Center-of-Mass det. time= 890.7 min (1,641.6 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

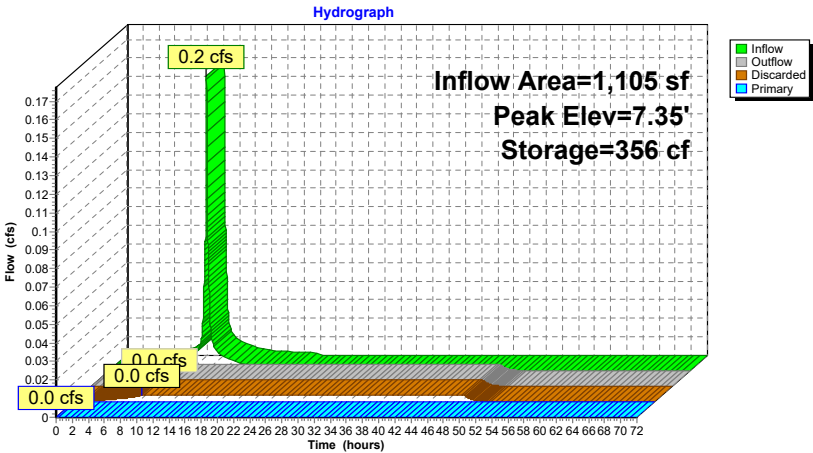
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 8.48 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 103P:



Summary for Pond 104P:

Inflow Area = 1,104 sf, 97.46% Impervious, Inflow Depth = 6.04" for 10-Year event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 556 cf
Outflow = 0.0 cfs @ 8.48 hrs, Volume= 556 cf, Atten= 98%, Lag= 0.0 min
Discarded = 0.0 cfs @ 8.48 hrs, Volume= 556 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 7.35' @ 16.96 hrs Surf.Area= 294 sf Storage= 356 cf

Plug-Flow detention time= 889.7 min calculated for 556 cf (100% of inflow)
Center-of-Mass det. time= 889.6 min (1,640.6 - 751.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

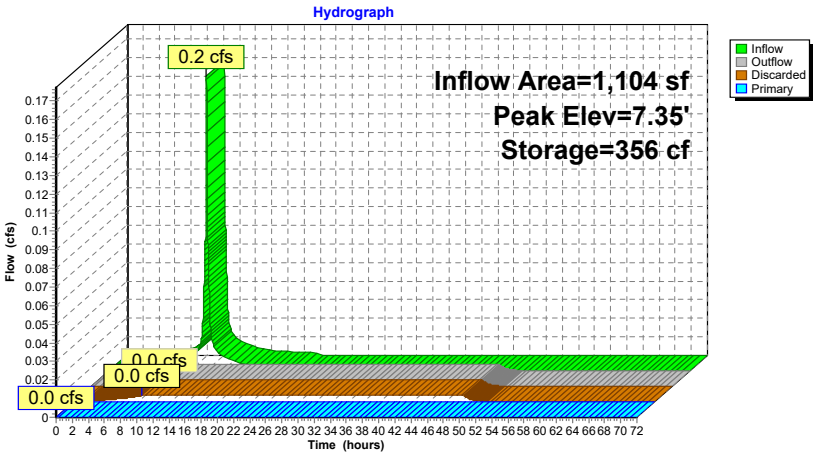
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 8.48 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 104P:



Summary for Pond 105P:

Inflow Area = 1,082 sf, 98.06% Impervious, Inflow Depth = 6.16" for 10-Year event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 556 cf
Outflow = 0.0 cfs @ 8.36 hrs, Volume= 556 cf, Atten= 98%, Lag= 0.0 min
Discarded = 0.0 cfs @ 8.36 hrs, Volume= 556 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 7.33' @ 16.87 hrs Surf.Area= 294 sf Storage= 351 cf

Plug-Flow detention time= 868.2 min calculated for 555 cf (100% of inflow)
Center-of-Mass det. time= 868.3 min (1,612.5 - 744.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

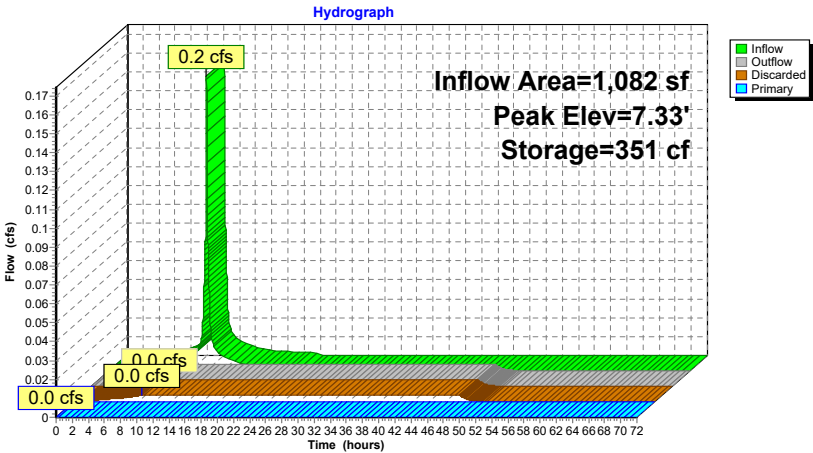
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 8.36 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 105P:



Summary for Pond 106P:

Inflow Area = 1,056 sf, 99.24% Impervious, Inflow Depth = 6.16" for 10-Year event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 542 cf
Outflow = 0.0 cfs @ 8.44 hrs, Volume= 542 cf, Atten= 98%, Lag= 0.0 min
Discarded = 0.0 cfs @ 8.44 hrs, Volume= 542 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 7.29' @ 16.77 hrs Surf.Area= 294 sf Storage= 340 cf

Plug-Flow detention time= 841.5 min calculated for 542 cf (100% of inflow)
Center-of-Mass det. time= 841.5 min (1,585.7 - 744.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

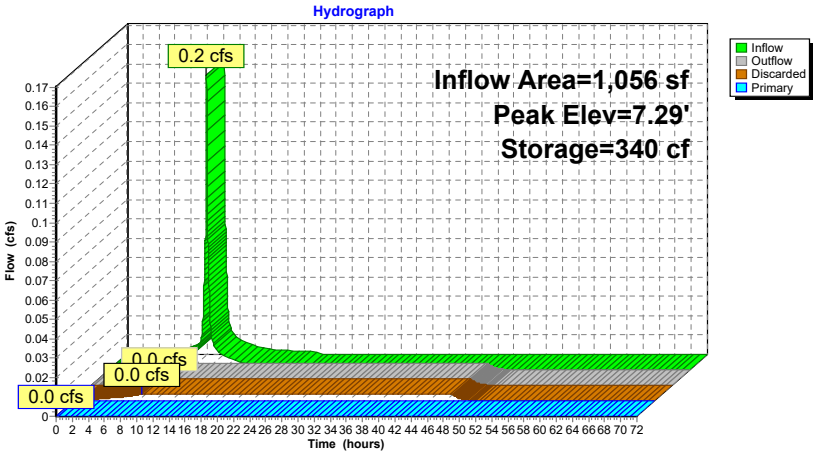
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 8.44 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 106P:

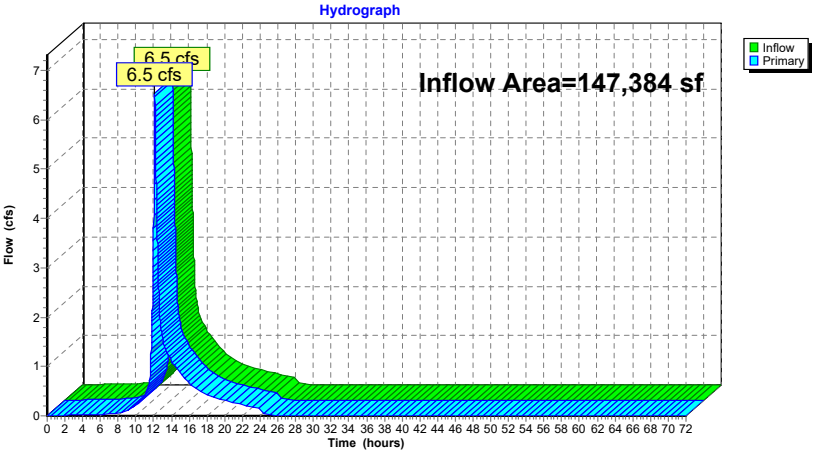


Summary for Link 1L: Towards Wetlands

Inflow Area = 147,384 sf, 49.02% Impervious, Inflow Depth = 3.24" for 10-Year event
Inflow = 6.5 cfs @ 12.12 hrs, Volume= 39,784 cf
Primary = 6.5 cfs @ 12.12 hrs, Volume= 39,784 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: Towards Wetlands

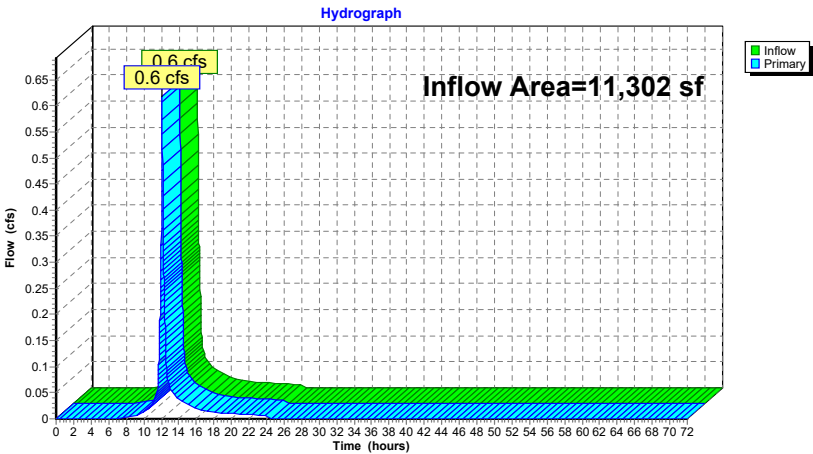


Summary for Link 2L: Towards Street

Inflow Area = 11,302 sf, 56.45% Impervious, Inflow Depth = 2.03" for 10-Year event
Inflow = 0.6 cfs @ 12.09 hrs, Volume= 1,916 cf
Primary = 0.6 cfs @ 12.09 hrs, Volume= 1,916 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 2L: Towards Street

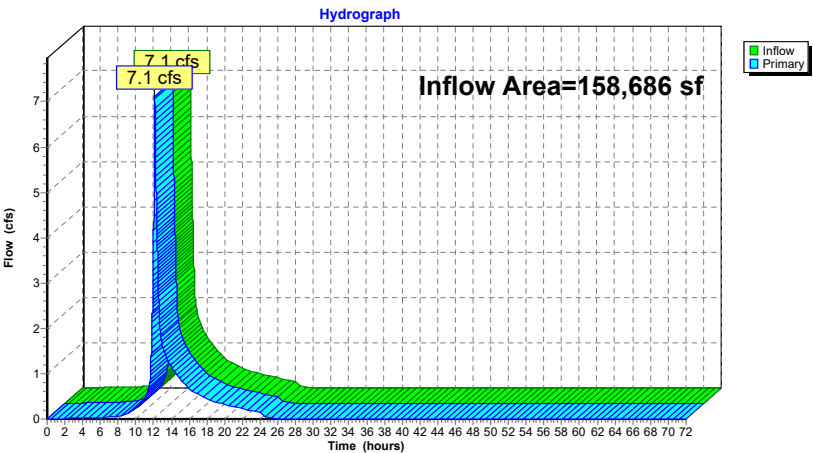


Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 49.55% Impervious, Inflow Depth = 3.15" for 10-Year event
Inflow = 7.1 cfs @ 12.11 hrs, Volume= 41,700 cf
Primary = 7.1 cfs @ 12.11 hrs, Volume= 41,700 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 100L: Total Flows



2340702-PR

Prepared by BSC Group

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Type III 24-hr 25-Year Rainfall=8.30"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1	Runoff Area=22,742 sf 72.16% Impervious Runoff Depth=7.22" Tc=6.0 min CN=91 Runoff=4.1 cfs 13,685 cf
Subcatchment 2.1S: Building	Runoff Area=14,140 sf 100.00% Impervious Runoff Depth=8.06" Tc=6.0 min CN=98 Runoff=2.6 cfs 9,497 cf
Subcatchment 2S: Building Roof	Runoff Area=18,785 sf 100.00% Impervious Runoff Depth=8.06" Tc=6.0 min CN=98 Runoff=3.5 cfs 12,617 cf
Subcatchment 3.1S: Backyard ADs	Runoff Area=8,985 sf 3.03% Impervious Runoff Depth=5.31" Flow Length=147' Tc=10.3 min CN=75 Runoff=1.1 cfs 3,978 cf
Subcatchment 3S: Townhouse Roofs	Runoff Area=13,067 sf 100.00% Impervious Runoff Depth=8.06" Tc=6.0 min CN=98 Runoff=2.4 cfs 8,777 cf
Subcatchment 4.2S: Townhouse TDs	Runoff Area=1,112 sf 95.68% Impervious Runoff Depth=7.94" Tc=6.0 min CN=97 Runoff=0.2 cfs 736 cf
Subcatchment 4.3S: Townhouse TDs	Runoff Area=1,105 sf 97.29% Impervious Runoff Depth=7.94" Tc=6.0 min CN=97 Runoff=0.2 cfs 731 cf
Subcatchment 4.4S: Townhouse TDs	Runoff Area=1,104 sf 97.46% Impervious Runoff Depth=7.94" Tc=6.0 min CN=97 Runoff=0.2 cfs 730 cf
Subcatchment 4.5S: Townhouse TDs	Runoff Area=1,082 sf 98.06% Impervious Runoff Depth=8.06" Tc=6.0 min CN=98 Runoff=0.2 cfs 727 cf
Subcatchment 4.6S: Townhouse TDs	Runoff Area=1,056 sf 99.24% Impervious Runoff Depth=8.06" Tc=6.0 min CN=98 Runoff=0.2 cfs 709 cf
Subcatchment 5S: TD-1	Runoff Area=5,851 sf 51.63% Impervious Runoff Depth=6.62" Tc=6.0 min CN=86 Runoff=1.0 cfs 3,229 cf
Subcatchment 6.1S: East driveway	Runoff Area=12,275 sf 52.50% Impervious Runoff Depth=6.74" Tc=6.0 min CN=87 Runoff=2.1 cfs 6,897 cf
Subcatchment 6S: Bypass Towards	Runoff Area=51,539 sf 0.21% Impervious Runoff Depth=5.19" Flow Length=125' Tc=14.0 min CN=74 Runoff=5.6 cfs 22,311 cf
Subcatchment 7S: To Street	Runoff Area=5,843 sf 18.07% Impervious Runoff Depth=5.67" Tc=6.0 min CN=78 Runoff=0.9 cfs 2,760 cf
Pond 1P: Underground Infiltration System	Peak Elev=8.26' Storage=15,848 cf Inflow=8.7 cfs 42,269 cf Discarded=0.1 cfs 19,582 cf Primary=2.3 cfs 22,686 cf Outflow=2.4 cfs 42,269 cf
Pond 2P: Rooftop Detention	Peak Elev=57.44' Storage=6,622 cf Inflow=3.5 cfs 12,617 cf Outflow=0.3 cfs 12,601 cf

2340702-PR

Prepared by BSC Group

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Type III 24-hr 25-Year Rainfall=8.30"

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Pond 3P: Rain garden	Peak Elev=6.42' Storage=217 cf Inflow=2.1 cfs 6,897 cf Discarded=0.0 cfs 459 cf Primary=2.1 cfs 6,438 cf Outflow=2.1 cfs 6,897 cf
Pond 102P:	Peak Elev=7.91' Storage=506 cf Inflow=0.2 cfs 736 cf Discarded=0.0 cfs 736 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 736 cf
Pond 103P:	Peak Elev=7.90' Storage=502 cf Inflow=0.2 cfs 731 cf Discarded=0.0 cfs 731 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 731 cf
Pond 104P:	Peak Elev=7.90' Storage=502 cf Inflow=0.2 cfs 730 cf Discarded=0.0 cfs 730 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 730 cf
Pond 105P:	Peak Elev=7.87' Storage=493 cf Inflow=0.2 cfs 727 cf Discarded=0.0 cfs 727 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 727 cf
Pond 106P:	Peak Elev=7.81' Storage=478 cf Inflow=0.2 cfs 709 cf Discarded=0.0 cfs 709 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 709 cf
Link 1L: Towards Wetlands	Inflow=9.7 cfs 60,933 cf Primary=9.7 cfs 60,933 cf
Link 2L: Towards Street	Inflow=0.9 cfs 2,760 cf Primary=0.9 cfs 2,760 cf
Link 100L: Total Flows	Inflow=10.4 cfs 63,693 cf Primary=10.4 cfs 63,693 cf
Total Runoff Area = 158,686 sf Runoff Volume = 87,385 cf Average Runoff Depth = 6.61" 50.45% Pervious = 80,060 sf 49.55% Impervious = 78,626 sf	

Summary for Subcatchment 1S: CB-1

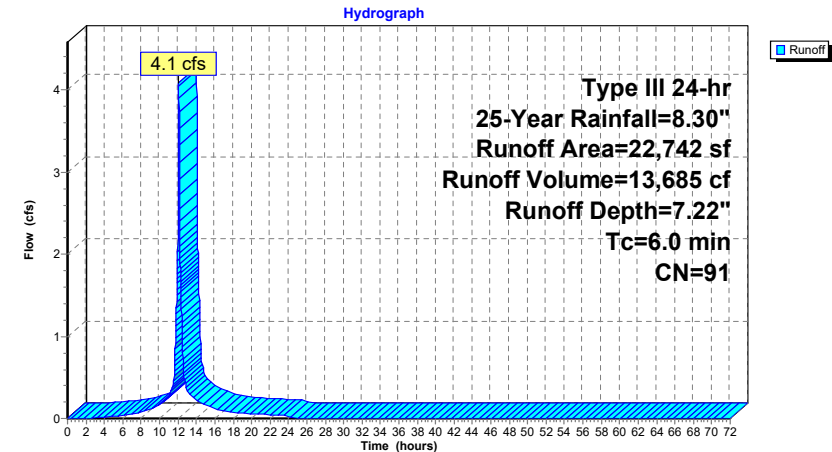
Runoff = 4.1 cfs @ 12.08 hrs, Volume= 13,685 cf, Depth= 7.22"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
16,410	98	Paved parking, HSG C
6,332	74	>75% Grass cover, Good, HSG C
22,742	91	Weighted Average
6,332		27.84% Pervious Area
16,410		72.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 1S: CB-1



Summary for Subcatchment 2.1S: Building Roof-Southeast

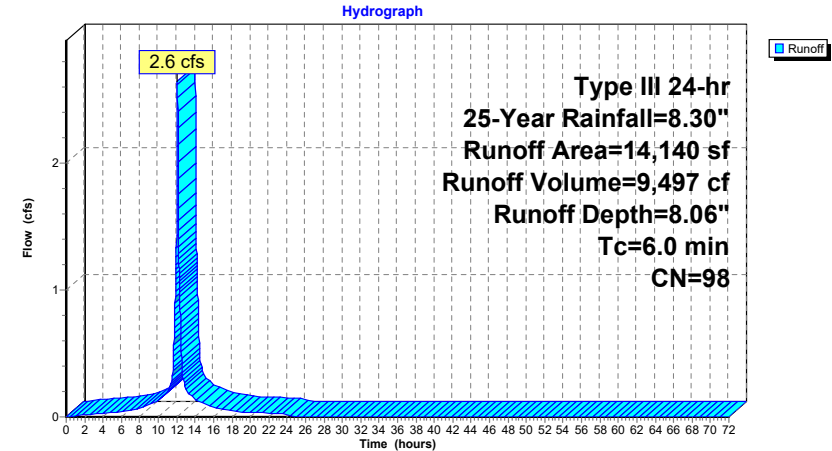
Runoff = 2.6 cfs @ 12.08 hrs, Volume= 9,497 cf, Depth= 8.06"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
14,140	98	Roofs, HSG C
14,140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2.1S: Building Roof-Southeast



Summary for Subcatchment 2S: Building Roof

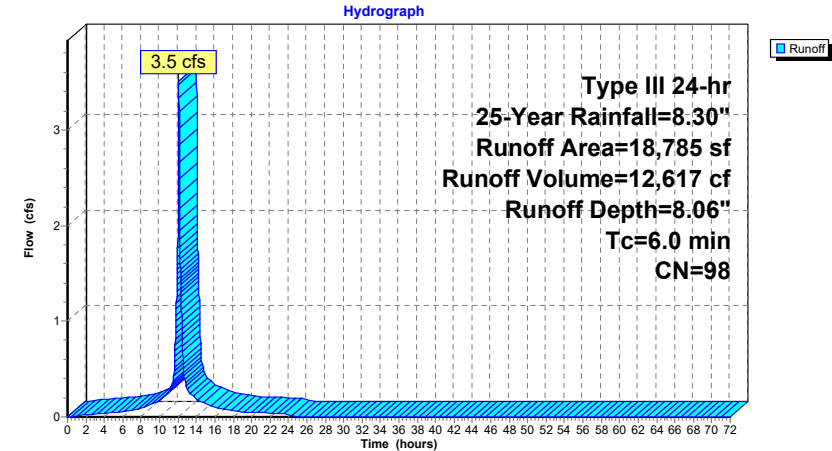
Runoff = 3.5 cfs @ 12.08 hrs, Volume= 12,617 cf, Depth= 8.06"
Routed to Pond 2P : Rooftop Detention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
18,785	98	Roofs, HSG C
18,785		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2S: Building Roof



Summary for Subcatchment 3.1S: Backyard ADs

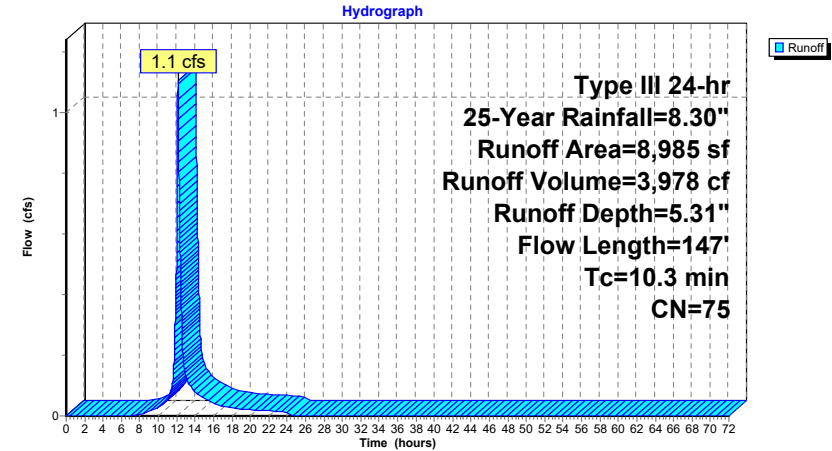
Runoff = 1.1 cfs @ 12.14 hrs, Volume= 3,978 cf, Depth= 5.31"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
272	98	Unconnected pavement, HSG C
8,302	74	>75% Grass cover, Good, HSG C
411	89	Gravel sidewalk, HSG C
8,985	75	Weighted Average
8,713		96.97% Pervious Area
272		3.03% Impervious Area
272		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0142	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.23"
0.9	97	0.0154	1.86		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
10.3	147				Total

Subcatchment 3.1S: Backyard ADs



Summary for Subcatchment 3S: Townhouse Roofs

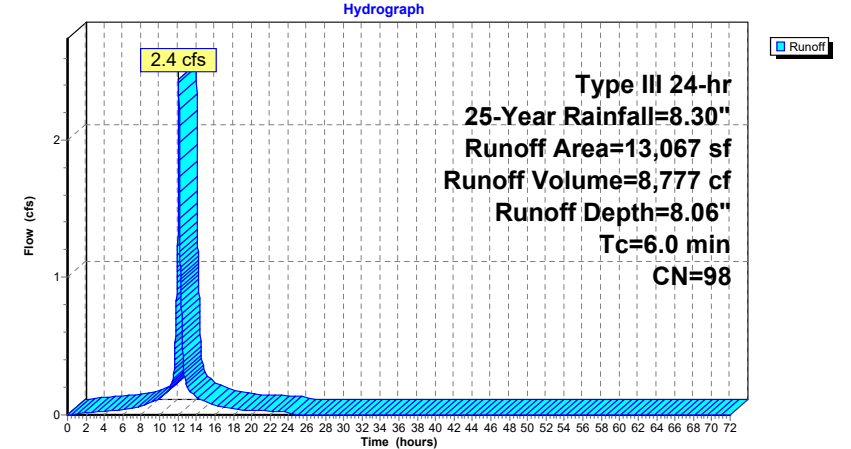
Runoff = 2.4 cfs @ 12.08 hrs, Volume= 8,777 cf, Depth= 8.06"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
13,067	98	Roofs, HSG C
13,067		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 3S: Townhouse Roofs



Summary for Subcatchment 4.2S: Townhouse TDs

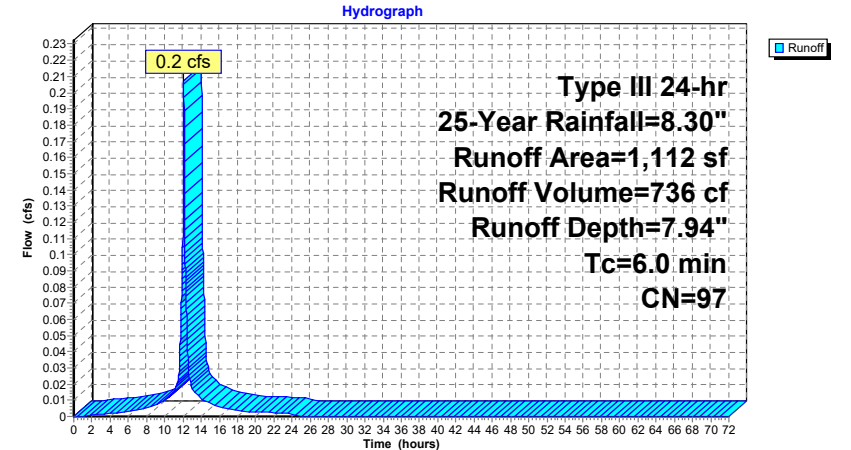
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 736 cf, Depth= 7.94"
Routed to Pond 102P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
1,064	98	Paved parking, HSG C
48	74	>75% Grass cover, Good, HSG C
1,112	97	Weighted Average
48		4.32% Pervious Area
1,064		95.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.2S: Townhouse TDs



Summary for Subcatchment 4.3S: Townhouse TDs

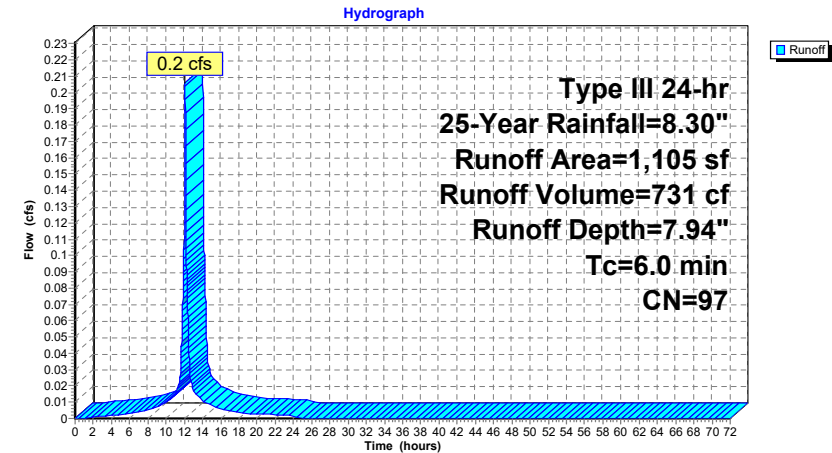
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 731 cf, Depth= 7.94"
Routed to Pond 103P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
1,075	98	Paved parking, HSG C
30	74	>75% Grass cover, Good, HSG C
1,105	97	Weighted Average
30		2.71% Pervious Area
1,075		97.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.3S: Townhouse TDs



Summary for Subcatchment 4.4S: Townhouse TDs

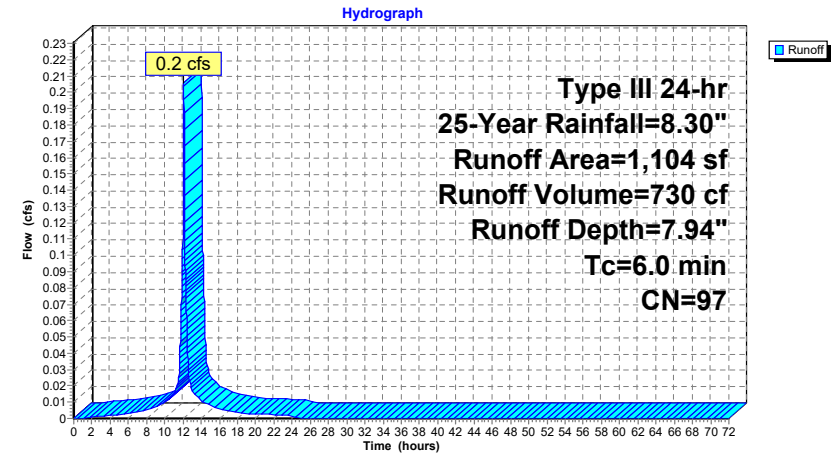
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 730 cf, Depth= 7.94"
Routed to Pond 104P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
1,076	98	Paved parking, HSG C
28	74	>75% Grass cover, Good, HSG C
1,104	97	Weighted Average
28		2.54% Pervious Area
1,076		97.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.4S: Townhouse TDs



Summary for Subcatchment 4.5S: Townhouse TDs

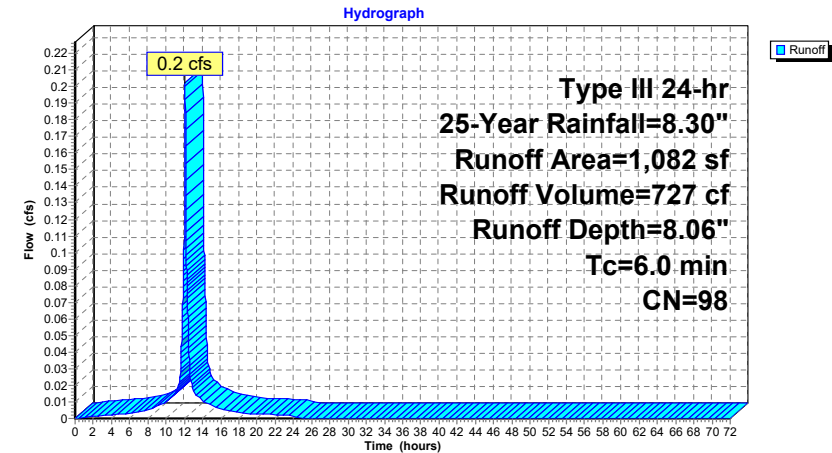
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 727 cf, Depth= 8.06"
Routed to Pond 105P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
1,061	98	Paved parking, HSG C
21	74	>75% Grass cover, Good, HSG C
1,082	98	Weighted Average
21		1.94% Pervious Area
1,061		98.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.5S: Townhouse TDs



Summary for Subcatchment 4.6S: Townhouse TDs

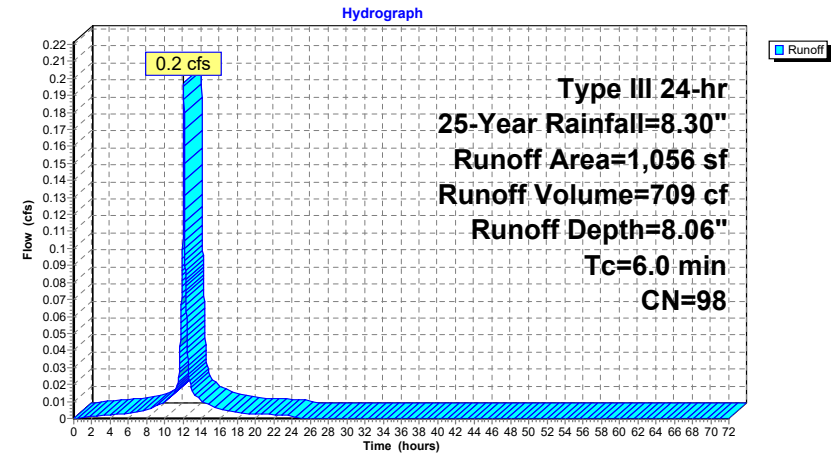
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 709 cf, Depth= 8.06"
Routed to Pond 106P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
1,048	98	Paved parking, HSG C
8	74	>75% Grass cover, Good, HSG C
1,056	98	Weighted Average
8		0.76% Pervious Area
1,048		99.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.6S: Townhouse TDs



Summary for Subcatchment 5S: TD-1

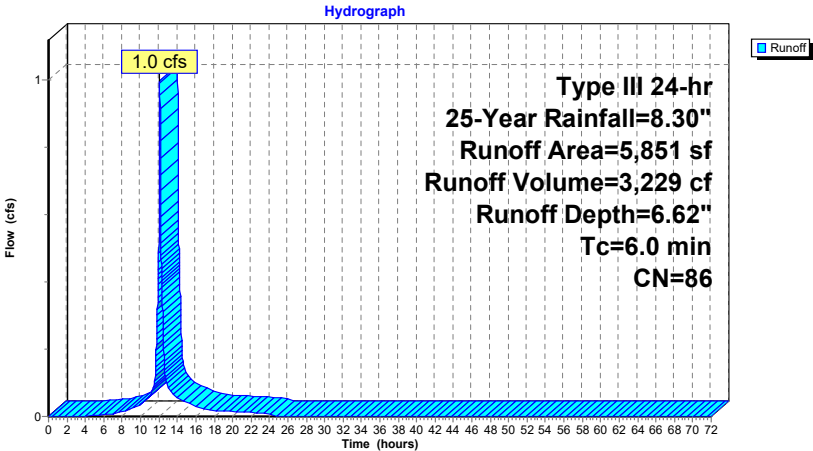
Runoff = 1.0 cfs @ 12.08 hrs, Volume= 3,229 cf, Depth= 6.62"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
3,021	98	Paved parking, HSG C
2,830	74	>75% Grass cover, Good, HSG C
5,851	86	Weighted Average
2,830		48.37% Pervious Area
3,021		51.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 5S: TD-1



Summary for Subcatchment 6.1S: East driveway

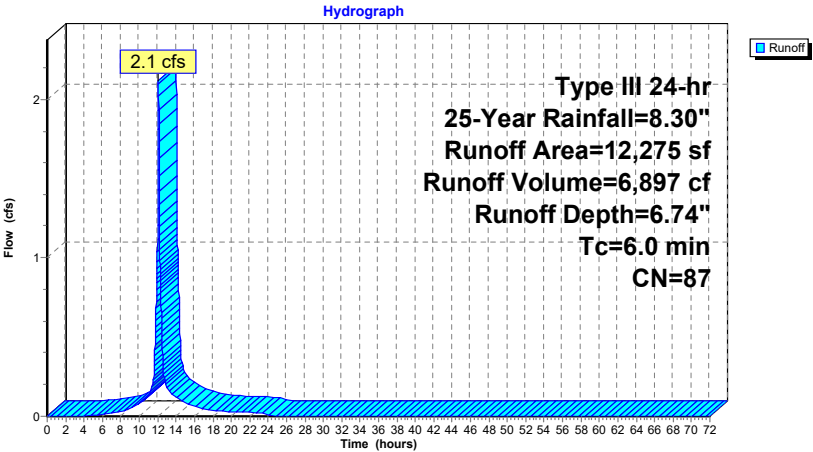
Runoff = 2.1 cfs @ 12.08 hrs, Volume= 6,897 cf, Depth= 6.74"
Routed to Pond 3P : Rain garden

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
5,611	74	>75% Grass cover, Good, HSG C
6,444	98	Paved roads w/curbs & sewers, HSG C
220	89	Gravel roads, HSG C
12,275	87	Weighted Average
5,831		47.50% Pervious Area
6,444		52.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 6.1S: East driveway



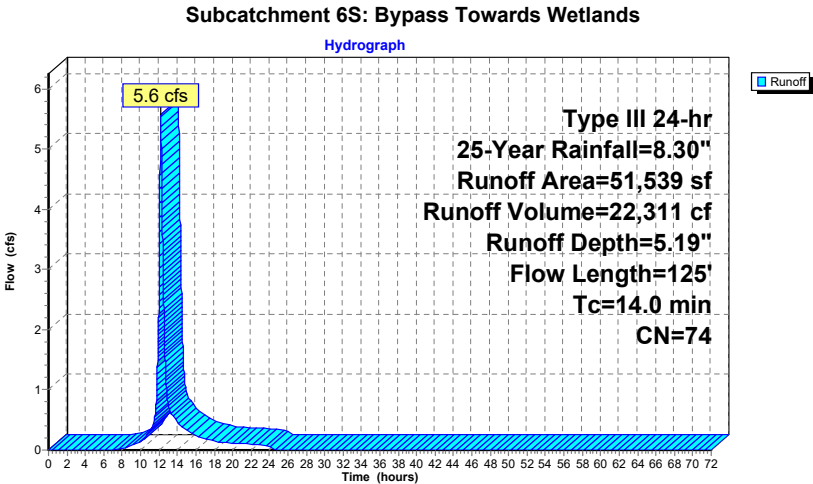
Summary for Subcatchment 6S: Bypass Towards Wetlands

Runoff = 5.6 cfs @ 12.19 hrs, Volume= 22,311 cf, Depth= 5.19"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
4,985	70	Woods, Good, HSG C
46,447	74	>75% Grass cover, Good, HSG C
107	98	Roofs, HSG C
51,539	74	Weighted Average
51,432		99.79% Pervious Area
107		0.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0220	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.23"
2.2	75	0.0133	0.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.0	125	Total			



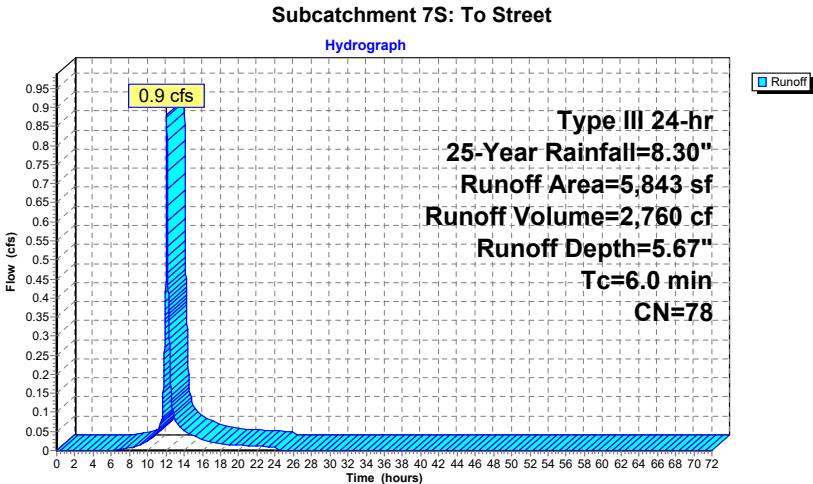
Summary for Subcatchment 7S: To Street

Runoff = 0.9 cfs @ 12.09 hrs, Volume= 2,760 cf, Depth= 5.67"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=8.30"

Area (sf)	CN	Description
1,056	98	Paved parking, HSG C
4,787	74	>75% Grass cover, Good, HSG C
5,843	78	Weighted Average
4,787		81.93% Pervious Area
1,056		18.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc



Summary for Pond 1P: Underground Infiltration System

Inflow Area = 69,430 sf, 74.25% Impervious, Inflow Depth = 7.31" for 25-Year event
Inflow = 8.7 cfs @ 12.09 hrs, Volume= 42,269 cf
Outflow = 2.4 cfs @ 12.48 hrs, Volume= 42,269 cf, Atten= 73%, Lag= 23.5 min
Discarded = 0.1 cfs @ 6.59 hrs, Volume= 19,582 cf
Primary = 2.3 cfs @ 12.48 hrs, Volume= 22,686 cf
Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.26' @ 12.48 hrs Surf.Area= 8,137 sf Storage= 15,848 cf

Plug-Flow detention time= 543.3 min calculated for 42,263 cf (100% of inflow)
Center-of-Mass det. time= 543.2 min (1,400.8 - 857.6)

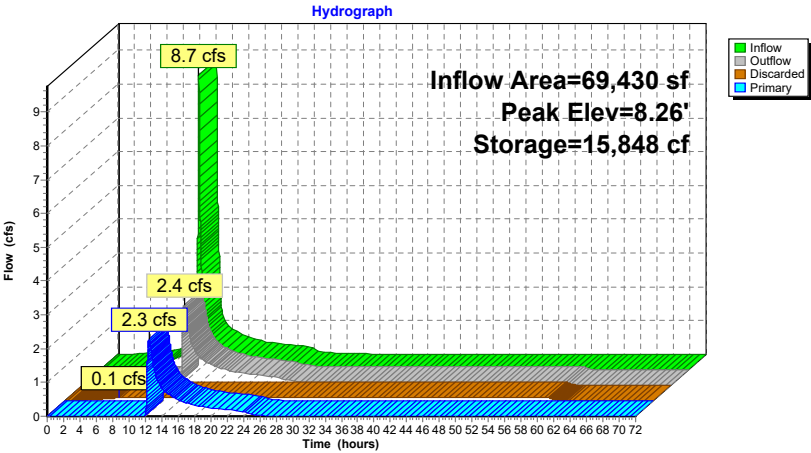
Volume	Invert	Avail.Storage	Storage Description
#1	6.00'	20,994 cf	6.89'W x 14.06'L x 3.00'H StormTrap ST-1 Units (Irregular Shape)x 84 24,412 cf Overall x 86.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	7.50'	15.0" Round Culvert L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.50' / 6.00' S= 0.0079 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.1 cfs @ 6.59 hrs HW=6.03' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=2.3 cfs @ 12.48 hrs HW=8.26' (Free Discharge)
2=Culvert (Barrel Controls 2.3 cfs @ 4.16 fps)

Pond 1P: Underground Infiltration System



Summary for Pond 2P: Rooftop Detention

Inflow Area = 18,785 sf, 100.00% Impervious, Inflow Depth = 8.06" for 25-Year event
Inflow = 3.5 cfs @ 12.08 hrs, Volume= 12,617 cf
Outflow = 0.3 cfs @ 13.05 hrs, Volume= 12,601 cf, Atten= 92%, Lag= 57.7 min
Primary = 0.3 cfs @ 13.05 hrs, Volume= 12,601 cf
Routed to Pond 1P : Underground Infiltration System

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 57.44' @ 13.05 hrs Surf.Area= 15,000 sf Storage= 6,622 cf

Plug-Flow detention time= 323.4 min calculated for 12,599 cf (100% of inflow)
Center-of-Mass det. time= 322.8 min (1,063.6 - 740.8)

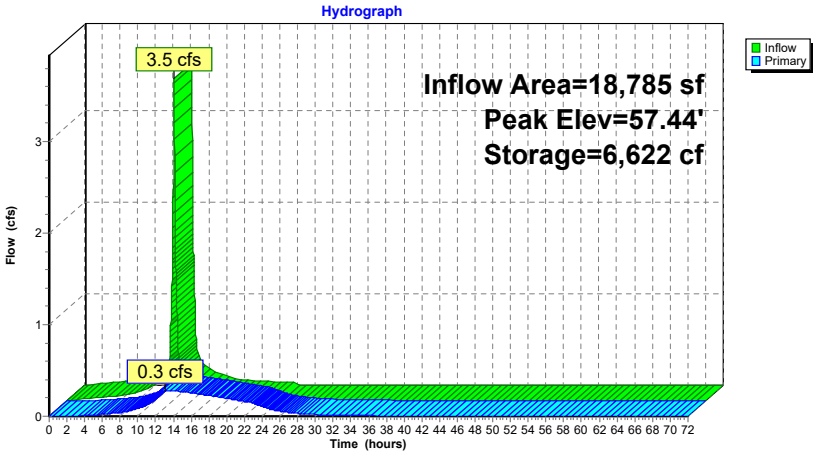
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,500 cf	Rooftop Detention (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	15,000	0	0
57.70	15,000	10,500	10,500

Device	Routing	Invert	Outlet Devices
#1	Primary	8.02'	12.0" Round Roof Drain L= 16.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 8.02' / 7.70' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	57.00'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.3 cfs @ 13.05 hrs HW=57.44' (Free Discharge)
1=Roof Drain (Passes 0.3 cfs of 23.3 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.3 cfs @ 3.20 fps)

Pond 2P: Rooftop Detention



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Type III 24-hr 25-Year Rainfall=8.30"

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Summary for Pond 3P: Rain garden

Inflow Area = 12,275 sf, 52.50% Impervious, Inflow Depth = 6.74" for 25-Year event
 Inflow = 2.1 cfs @ 12.08 hrs, Volume= 6,897 cf
 Outflow = 2.1 cfs @ 12.09 hrs, Volume= 6,897 cf, Atten= 0%, Lag= 0.3 min
 Discarded = 0.0 cfs @ 12.09 hrs, Volume= 459 cf
 Primary = 2.1 cfs @ 12.09 hrs, Volume= 6,438 cf
 Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 6.42' @ 12.09 hrs Surf.Area= 414 sf Storage= 217 cf

Plug-Flow detention time= 36.5 min calculated for 6,896 cf (100% of inflow)
 Center-of-Mass det. time= 36.7 min (820.5 - 783.8)

Volume	Invert	Avail.Storage	Storage Description			
#1	5.60'	253 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
5.60	125	46.0	0	0	125	
6.00	276	66.0	78	78	305	
6.30	350	73.0	94	172	385	
6.50	460	87.0	81	253	564	

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.60'	0.520 in/hr Exfiltration over Surface area
#2	Primary	6.30'	22.0' long x 5.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
			2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
			2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.0 cfs @ 12.09 hrs HW=6.42' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=2.1 cfs @ 12.09 hrs HW=6.42' (Free Discharge)
 ↳2=Broad-Crested Rectangular Weir (Weir Controls 2.1 cfs @ 0.81 fps)

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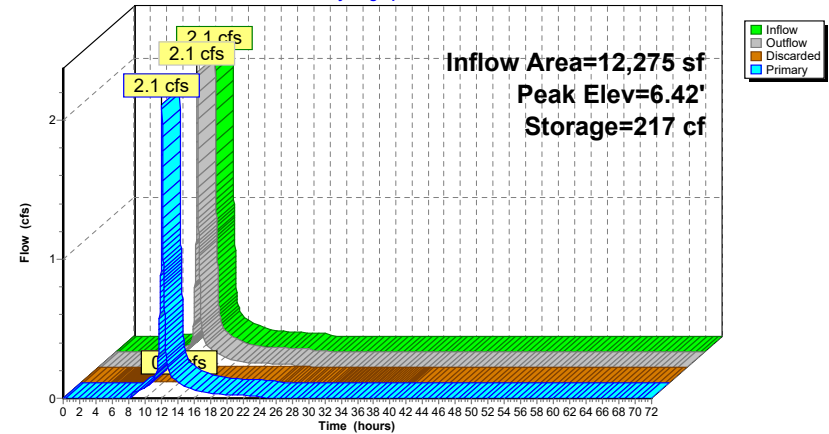
Type III 24-hr 25-Year Rainfall=8.30"

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Pond 3P: Rain garden

Hydrograph



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Type III 24-hr 25-Year Rainfall=8.30"

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Summary for Pond 102P:

Inflow Area = 1,112 sf, 95.68% Impervious, Inflow Depth = 7.94" for 25-Year event
 Inflow = 0.2 cfs @ 12.08 hrs, Volume= 736 cf
 Outflow = 0.0 cfs @ 7.35 hrs, Volume= 736 cf, Atten= 98%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 7.35 hrs, Volume= 736 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 7.91' @ 17.98 hrs Surf.Area= 294 sf Storage= 506 cf

Plug-Flow detention time= 1,250.3 min calculated for 736 cf (100% of inflow)
 Center-of-Mass det. time= 1,250.3 min (1,996.8 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 7.35 hrs HW=6.04' (Free Discharge)↳ **1=Exfiltration** (Exfiltration Controls 0.0 cfs)**Primary OutFlow** Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)↳ **2=Orifice/Grate** (Controls 0.0 cfs)**2340702-PR**

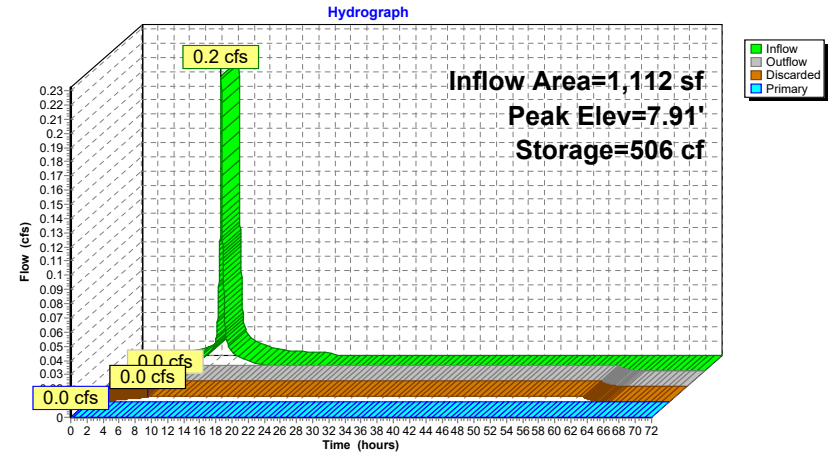
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Type III 24-hr 25-Year Rainfall=8.30"

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Pond 102P:

Summary for Pond 103P:

Inflow Area = 1,105 sf, 97.29% Impervious, Inflow Depth = 7.94" for 25-Year event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 731 cf
Outflow = 0.0 cfs @ 7.37 hrs, Volume= 731 cf, Atten= 98%, Lag= 0.0 min
Discarded = 0.0 cfs @ 7.37 hrs, Volume= 731 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 7.90' @ 17.96 hrs Surf.Area= 294 sf Storage= 502 cf

Plug-Flow detention time= 1,240.3 min calculated for 731 cf (100% of inflow)
Center-of-Mass det. time= 1,240.5 min (1,987.0 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97"L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97"L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

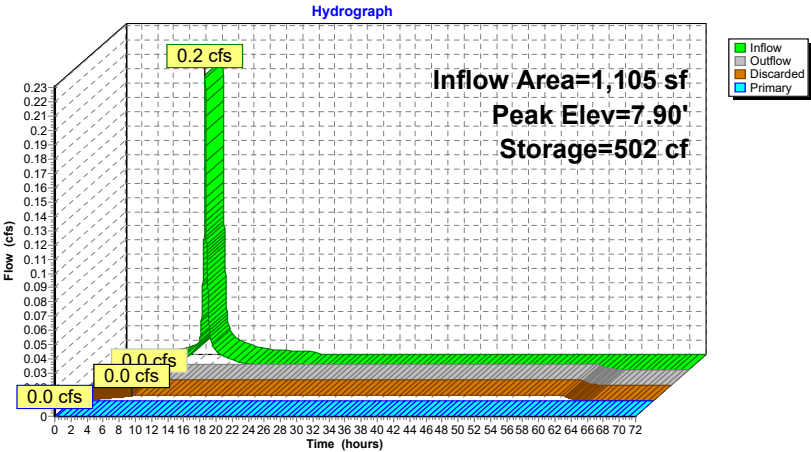
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 7.37 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 103P:



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Type III 24-hr 25-Year Rainfall=8.30"

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Summary for Pond 104P:

Inflow Area = 1,104 sf, 97.46% Impervious, Inflow Depth = 7.94" for 25-Year event
 Inflow = 0.2 cfs @ 12.08 hrs, Volume= 730 cf
 Outflow = 0.0 cfs @ 7.37 hrs, Volume= 730 cf, Atten= 98%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 7.37 hrs, Volume= 730 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 7.90' @ 17.95 hrs Surf.Area= 294 sf Storage= 502 cf

Plug-Flow detention time= 1,238.9 min calculated for 730 cf (100% of inflow)
 Center-of-Mass det. time= 1,239.1 min (1,985.6 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97"L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97"L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 7.37 hrs HW=6.04' (Free Discharge)↳ **1=Exfiltration** (Exfiltration Controls 0.0 cfs)**Primary OutFlow** Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)↳ **2=Orifice/Grate** (Controls 0.0 cfs)**2340702-PR**

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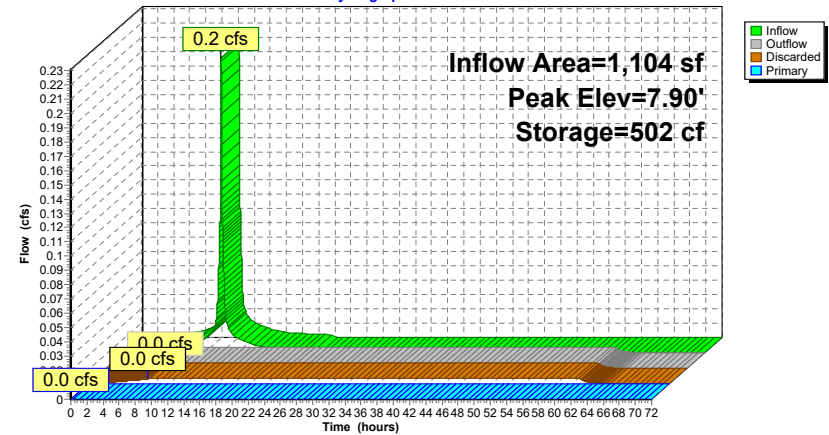
Type III 24-hr 25-Year Rainfall=8.30"

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Pond 104P:

Hydrograph



Summary for Pond 105P:

Inflow Area = 1,082 sf, 98.06% Impervious, Inflow Depth = 8.06" for 25-Year event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 727 cf
Outflow = 0.0 cfs @ 7.22 hrs, Volume= 727 cf, Atten= 98%, Lag= 0.0 min
Discarded = 0.0 cfs @ 7.22 hrs, Volume= 727 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 7.87' @ 17.89 hrs Surf.Area= 294 sf Storage= 493 cf

Plug-Flow detention time= 1,209.3 min calculated for 727 cf (100% of inflow)
Center-of-Mass det. time= 1,209.3 min (1,950.1 - 740.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

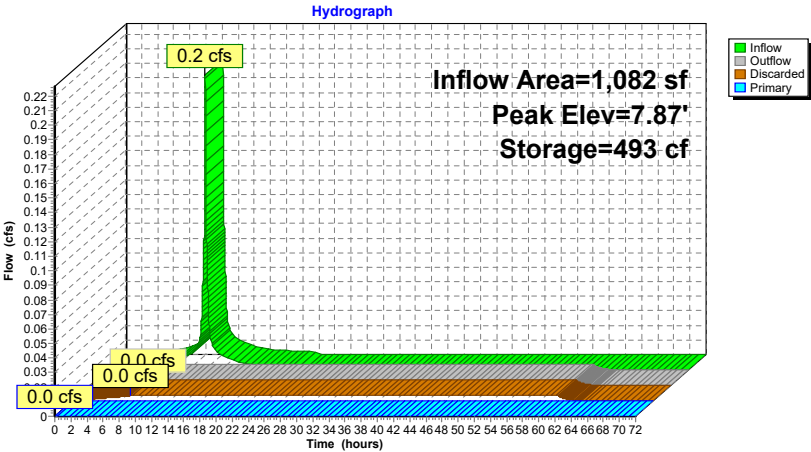
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 7.22 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 105P:



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Type III 24-hr 25-Year Rainfall=8.30"

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Summary for Pond 106P:

Inflow Area = 1,056 sf, 99.24% Impervious, Inflow Depth = 8.06" for 25-Year event
 Inflow = 0.2 cfs @ 12.08 hrs, Volume= 709 cf
 Outflow = 0.0 cfs @ 7.32 hrs, Volume= 709 cf, Atten= 98%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 7.32 hrs, Volume= 709 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 7.81' @ 17.80 hrs Surf.Area= 294 sf Storage= 478 cf

Plug-Flow detention time= 1,172.6 min calculated for 709 cf (100% of inflow)
 Center-of-Mass det. time= 1,172.7 min (1,913.5 - 740.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97"L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97"L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 7.32 hrs HW=6.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)

2=Orifice/Grate (Controls 0.0 cfs)

2340702-PR

Prepared by BSC Group

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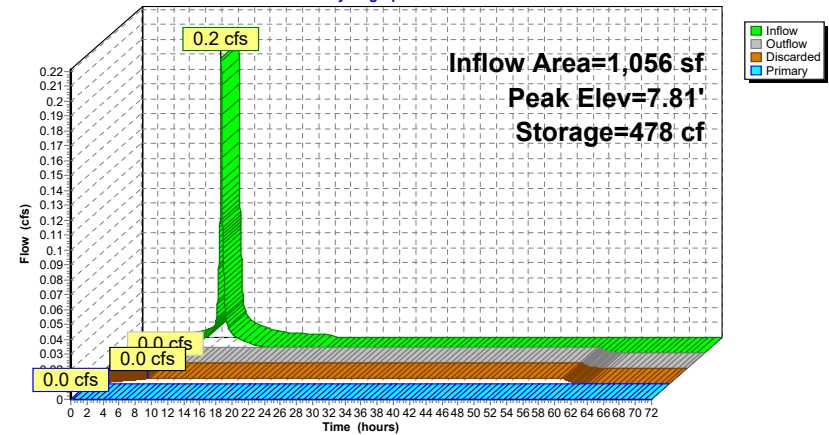
Type III 24-hr 25-Year Rainfall=8.30"

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Pond 106P:

Hydrograph

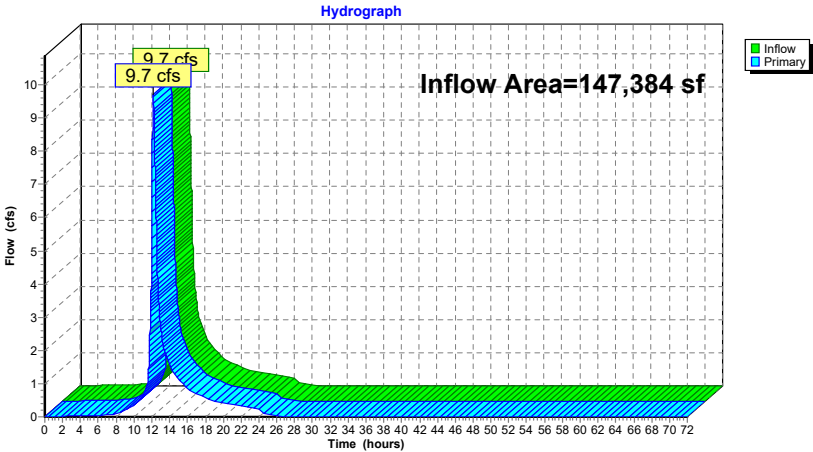


Summary for Link 1L: Towards Wetlands

Inflow Area = 147,384 sf, 49.02% Impervious, Inflow Depth = 4.96" for 25-Year event
Inflow = 9.7 cfs @ 12.15 hrs, Volume= 60,933 cf
Primary = 9.7 cfs @ 12.15 hrs, Volume= 60,933 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: Towards Wetlands

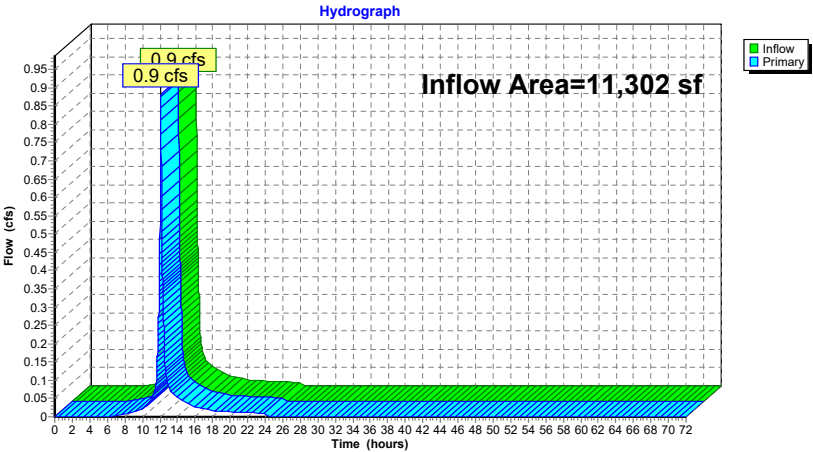


Summary for Link 2L: Towards Street

Inflow Area = 11,302 sf, 56.45% Impervious, Inflow Depth = 2.93" for 25-Year event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 2,760 cf
Primary = 0.9 cfs @ 12.09 hrs, Volume= 2,760 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 2L: Towards Street

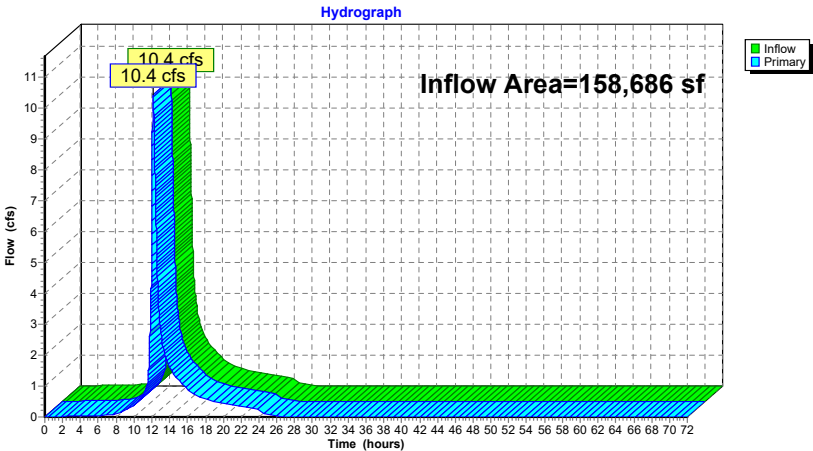


Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 49.55% Impervious, Inflow Depth = 4.82" for 25-Year event
Inflow = 10.4 cfs @ 12.14 hrs, Volume= 63,693 cf
Primary = 10.4 cfs @ 12.14 hrs, Volume= 63,693 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 100L: Total Flows



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1	Runoff Area=22,742 sf 72.16% Impervious Runoff Depth=8.58" Tc=6.0 min CN=91 Runoff=4.8 cfs 16,254 cf
Subcatchment 2.1S: Building	Runoff Area=14,140 sf 100.00% Impervious Runoff Depth=9.43" Tc=6.0 min CN=98 Runoff=3.1 cfs 11,111 cf
Subcatchment 2S: Building Roof	Runoff Area=18,785 sf 100.00% Impervious Runoff Depth=9.43" Tc=6.0 min CN=98 Runoff=4.1 cfs 14,761 cf
Subcatchment 3.1S: Backyard ADs	Runoff Area=8,985 sf 3.03% Impervious Runoff Depth=6.57" Flow Length=147' Tc=10.3 min CN=75 Runoff=1.4 cfs 4,920 cf
Subcatchment 3S: Townhouse Roofs	Runoff Area=13,067 sf 100.00% Impervious Runoff Depth=9.43" Tc=6.0 min CN=98 Runoff=2.9 cfs 10,268 cf
Subcatchment 4.2S: Townhouse TDs	Runoff Area=1,112 sf 95.68% Impervious Runoff Depth=9.31" Tc=6.0 min CN=97 Runoff=0.2 cfs 863 cf
Subcatchment 4.3S: Townhouse TDs	Runoff Area=1,105 sf 97.29% Impervious Runoff Depth=9.31" Tc=6.0 min CN=97 Runoff=0.2 cfs 857 cf
Subcatchment 4.4S: Townhouse TDs	Runoff Area=1,104 sf 97.46% Impervious Runoff Depth=9.31" Tc=6.0 min CN=97 Runoff=0.2 cfs 856 cf
Subcatchment 4.5S: Townhouse TDs	Runoff Area=1,082 sf 98.06% Impervious Runoff Depth=9.43" Tc=6.0 min CN=98 Runoff=0.2 cfs 850 cf
Subcatchment 4.6S: Townhouse TDs	Runoff Area=1,056 sf 99.24% Impervious Runoff Depth=9.43" Tc=6.0 min CN=98 Runoff=0.2 cfs 830 cf
Subcatchment 5S: TD-1	Runoff Area=5,851 sf 51.63% Impervious Runoff Depth=7.96" Tc=6.0 min CN=86 Runoff=1.2 cfs 3,880 cf
Subcatchment 6.1S: East driveway	Runoff Area=12,275 sf 52.50% Impervious Runoff Depth=8.08" Tc=6.0 min CN=87 Runoff=2.5 cfs 8,268 cf
Subcatchment 6S: Bypass Towards	Runoff Area=51,539 sf 0.21% Impervious Runoff Depth=6.44" Flow Length=125' Tc=14.0 min CN=74 Runoff=6.9 cfs 27,672 cf
Subcatchment 7S: To Street	Runoff Area=5,843 sf 18.07% Impervious Runoff Depth=6.95" Tc=6.0 min CN=78 Runoff=1.1 cfs 3,385 cf
Pond 1P: Underground Infiltration System	Peak Elev=8.51' Storage=17,597 cf Inflow=10.3 cfs 50,065 cf Discarded=0.1 cfs 20,187 cf Primary=3.6 cfs 29,877 cf Outflow=3.7 cfs 50,064 cf
Pond 2P: Rooftop Detention	Peak Elev=57.52' Storage=7,804 cf Inflow=4.1 cfs 14,761 cf Outflow=0.3 cfs 14,743 cf

Pond 3P: Rain garden	Peak Elev=6.43' Storage=223 cf Inflow=2.5 cfs 8,268 cf Discarded=0.0 cfs 469 cf Primary=2.5 cfs 7,799 cf Outflow=2.5 cfs 8,268 cf
Pond 102P:	Peak Elev=8.33' Storage=617 cf Inflow=0.2 cfs 863 cf Discarded=0.0 cfs 860 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 860 cf
Pond 103P:	Peak Elev=8.31' Storage=612 cf Inflow=0.2 cfs 857 cf Discarded=0.0 cfs 856 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 856 cf
Pond 104P:	Peak Elev=8.31' Storage=611 cf Inflow=0.2 cfs 856 cf Discarded=0.0 cfs 855 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 855 cf
Pond 105P:	Peak Elev=8.27' Storage=600 cf Inflow=0.2 cfs 850 cf Discarded=0.0 cfs 850 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 850 cf
Pond 106P:	Peak Elev=8.20' Storage=582 cf Inflow=0.2 cfs 830 cf Discarded=0.0 cfs 830 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 830 cf
Link 1L: Towards Wetlands	Inflow=13.3 cfs 76,458 cf Primary=13.3 cfs 76,458 cf
Link 2L: Towards Street	Inflow=1.1 cfs 3,385 cf Primary=1.1 cfs 3,385 cf
Link 100L: Total Flows	Inflow=14.1 cfs 79,844 cf Primary=14.1 cfs 79,844 cf
Total Runoff Area = 158,686 sf Runoff Volume = 104,774 cf Average Runoff Depth = 7.92" 50.45% Pervious = 80,060 sf 49.55% Impervious = 78,626 sf	

Summary for Subcatchment 1S: CB-1

Runoff = 4.8 cfs @ 12.08 hrs, Volume= 16,254 cf, Depth= 8.58"

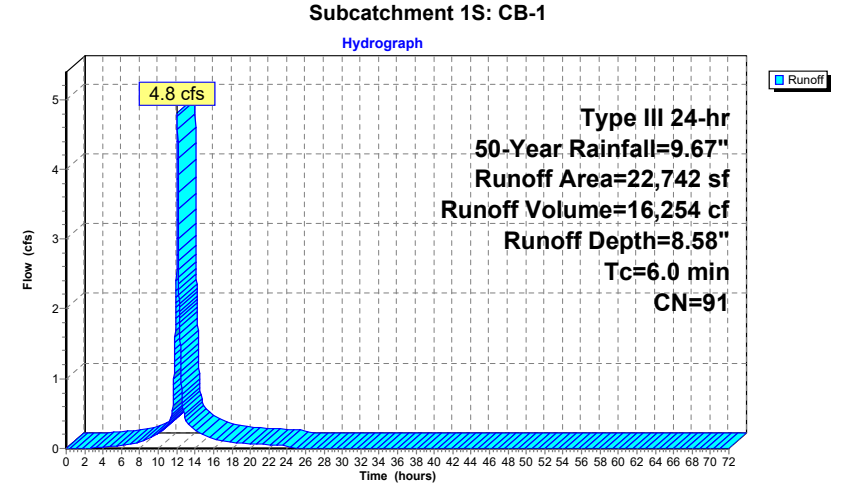
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
16,410	98	Paved parking, HSG C
6,332	74	>75% Grass cover, Good, HSG C
22,742	91	Weighted Average
6,332		27.84% Pervious Area
16,410		72.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc



Summary for Subcatchment 2.1S: Building Roof-Southeast

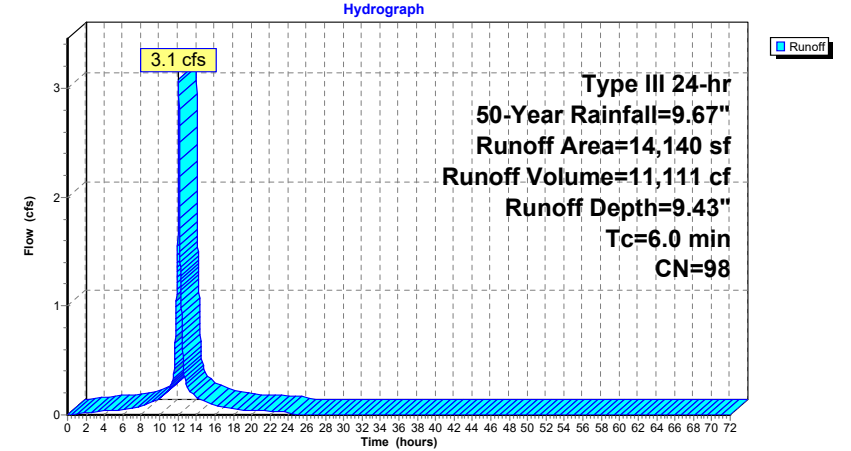
Runoff = 3.1 cfs @ 12.08 hrs, Volume= 11,111 cf, Depth= 9.43"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
14,140	98	Roofs, HSG C
14,140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2.1S: Building Roof-Southeast



Summary for Subcatchment 2S: Building Roof

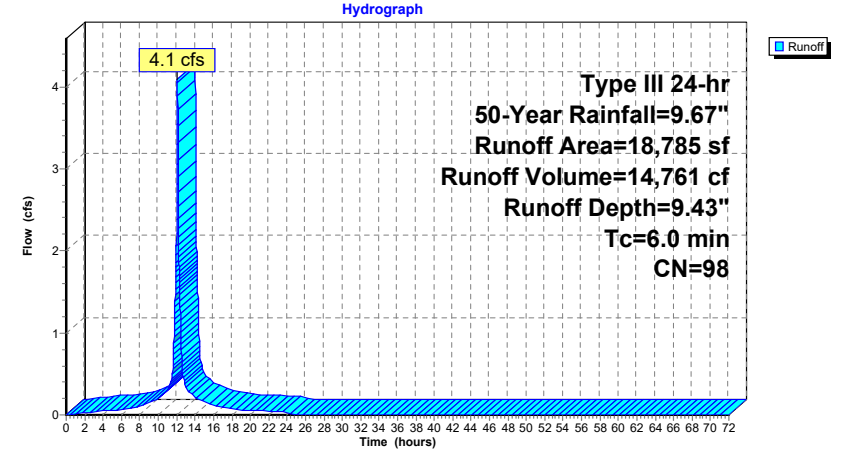
Runoff = 4.1 cfs @ 12.08 hrs, Volume= 14,761 cf, Depth= 9.43"
Routed to Pond 2P : Rooftop Detention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
18,785	98	Roofs, HSG C
18,785		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2S: Building Roof



Summary for Subcatchment 3.1S: Backyard ADs

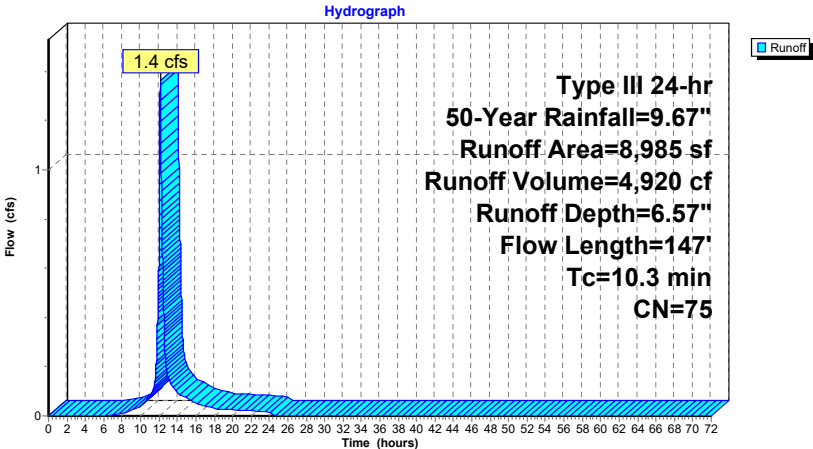
Runoff = 1.4 cfs @ 12.14 hrs, Volume= 4,920 cf, Depth= 6.57"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
272	98	Unconnected pavement, HSG C
8,302	74	>75% Grass cover, Good, HSG C
411	89	Gravel sidewalk, HSG C
8,985	75	Weighted Average
8,713		96.97% Pervious Area
272		3.03% Impervious Area
272		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0142	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.23"
0.9	97	0.0154	1.86		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
10.3	147	Total			

Subcatchment 3.1S: Backyard ADs



Summary for Subcatchment 3S: Townhouse Roofs

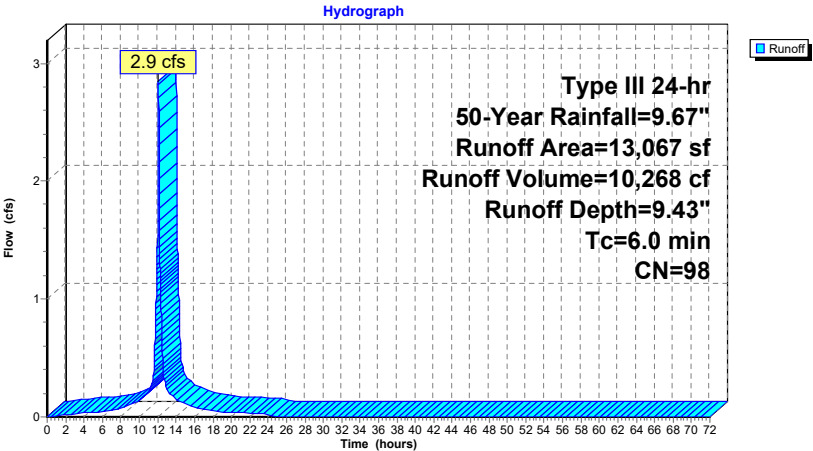
Runoff = 2.9 cfs @ 12.08 hrs, Volume= 10,268 cf, Depth= 9.43"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
13,067	98	Roofs, HSG C
13,067		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 3S: Townhouse Roofs



Summary for Subcatchment 4.2S: Townhouse TDs

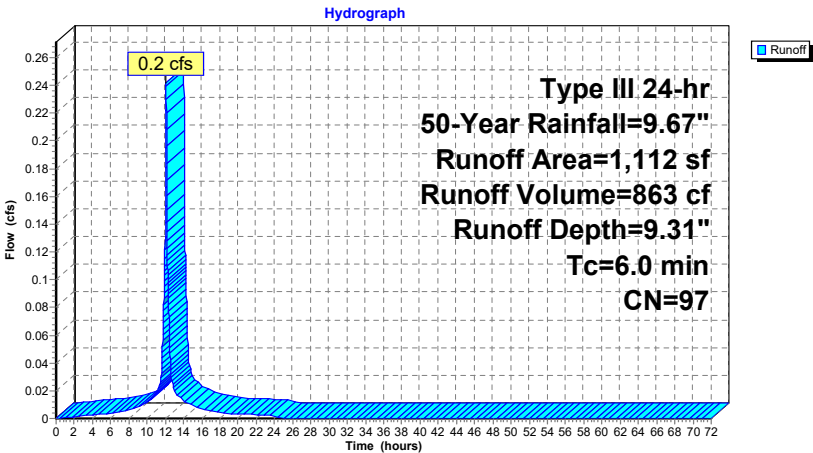
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 863 cf, Depth= 9.31"
Routed to Pond 102P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
1,064	98	Paved parking, HSG C
48	74	>75% Grass cover, Good, HSG C
1,112	97	Weighted Average
48		4.32% Pervious Area
1,064		95.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.2S: Townhouse TDs



Summary for Subcatchment 4.3S: Townhouse TDs

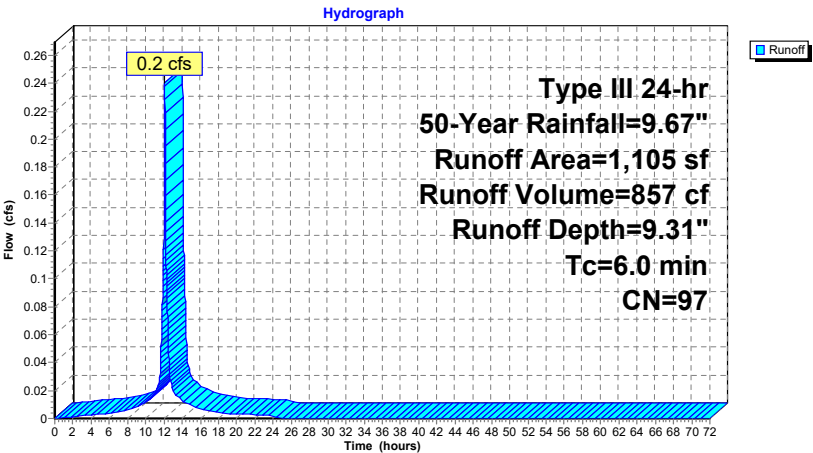
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 857 cf, Depth= 9.31"
Routed to Pond 103P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
1,075	98	Paved parking, HSG C
30	74	>75% Grass cover, Good, HSG C
1,105	97	Weighted Average
30		2.71% Pervious Area
1,075		97.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.3S: Townhouse TDs



Summary for Subcatchment 4.4S: Townhouse TDs

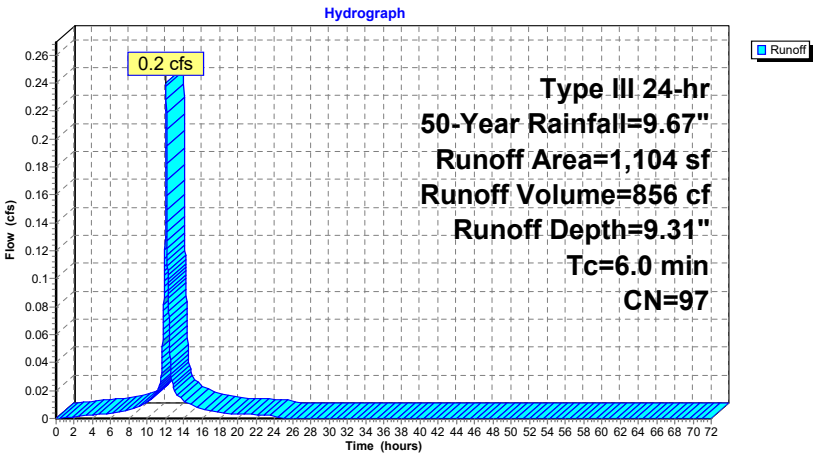
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 856 cf, Depth= 9.31"
Routed to Pond 104P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
1,076	98	Paved parking, HSG C
28	74	>75% Grass cover, Good, HSG C
1,104	97	Weighted Average
28		2.54% Pervious Area
1,076		97.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.4S: Townhouse TDs



Summary for Subcatchment 4.5S: Townhouse TDs

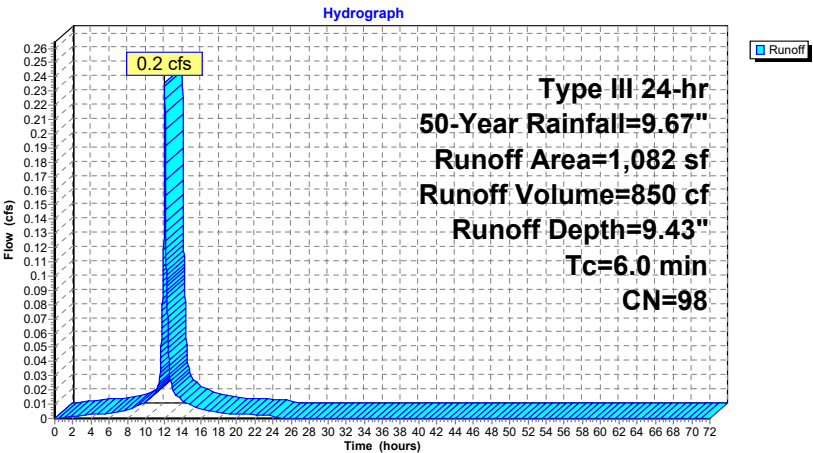
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 850 cf, Depth= 9.43"
Routed to Pond 105P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
1,061	98	Paved parking, HSG C
21	74	>75% Grass cover, Good, HSG C
1,082	98	Weighted Average
21		1.94% Pervious Area
1,061		98.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.5S: Townhouse TDs



Summary for Subcatchment 4.6S: Townhouse TDs

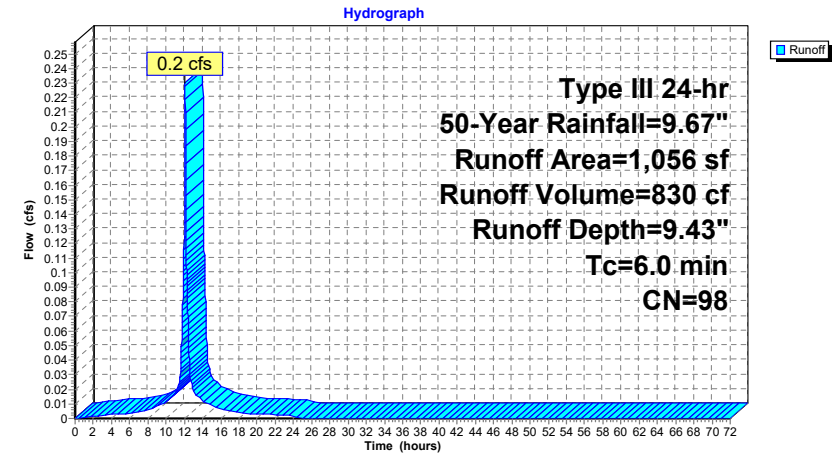
Runoff = 0.2 cfs @ 12.08 hrs, Volume= 830 cf, Depth= 9.43"
Routed to Pond 106P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
1,048	98	Paved parking, HSG C
8	74	>75% Grass cover, Good, HSG C
1,056	98	Weighted Average
8		0.76% Pervious Area
1,048		99.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.6S: Townhouse TDs



Summary for Subcatchment 5S: TD-1

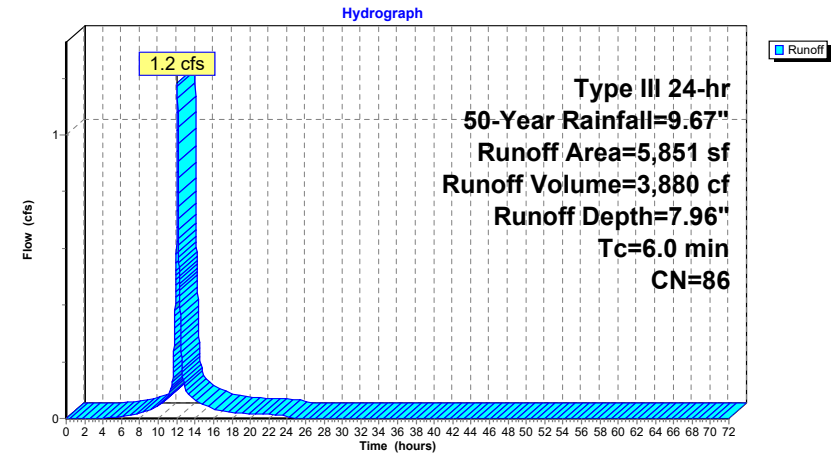
Runoff = 1.2 cfs @ 12.08 hrs, Volume= 3,880 cf, Depth= 7.96"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
3,021	98	Paved parking, HSG C
2,830	74	>75% Grass cover, Good, HSG C
5,851	86	Weighted Average
2,830		48.37% Pervious Area
3,021		51.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 5S: TD-1



Summary for Subcatchment 6.1S: East driveway

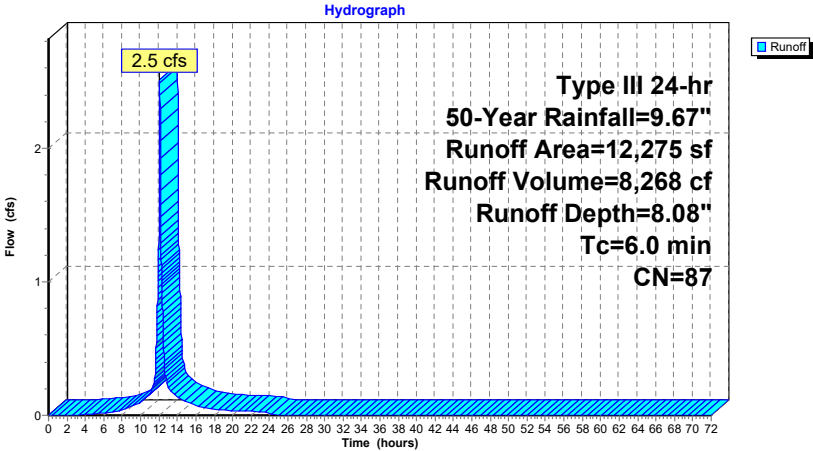
Runoff = 2.5 cfs @ 12.08 hrs, Volume= 8,268 cf, Depth= 8.08"
Routed to Pond 3P : Rain garden

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
5,611	74	>75% Grass cover, Good, HSG C
6,444	98	Paved roads w/curbs & sewers, HSG C
220	89	Gravel roads, HSG C
12,275	87	Weighted Average
5,831		47.50% Pervious Area
6,444		52.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 6.1S: East driveway



Summary for Subcatchment 6S: Bypass Towards Wetlands

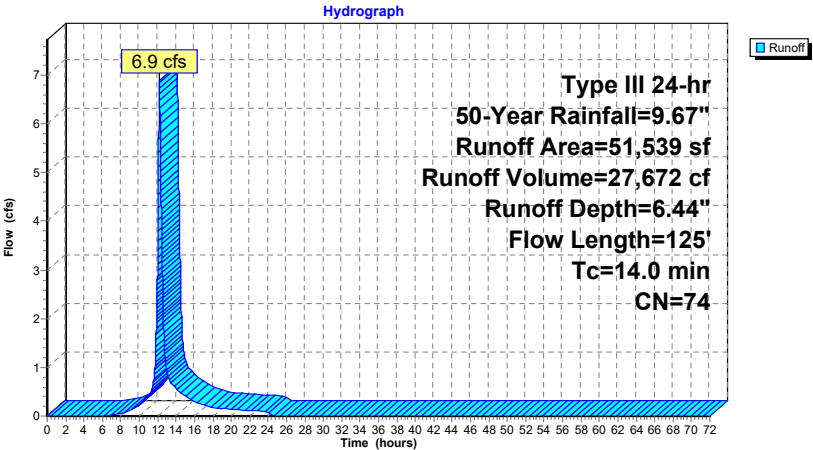
Runoff = 6.9 cfs @ 12.19 hrs, Volume= 27,672 cf, Depth= 6.44"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
4,985	70	Woods, Good, HSG C
46,447	74	>75% Grass cover, Good, HSG C
107	98	Roofs, HSG C
51,539	74	Weighted Average
51,432		99.79% Pervious Area
107		0.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0220	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.23"
2.2	75	0.0133	0.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.0	125	Total			

Subcatchment 6S: Bypass Towards Wetlands



Summary for Subcatchment 7S: To Street

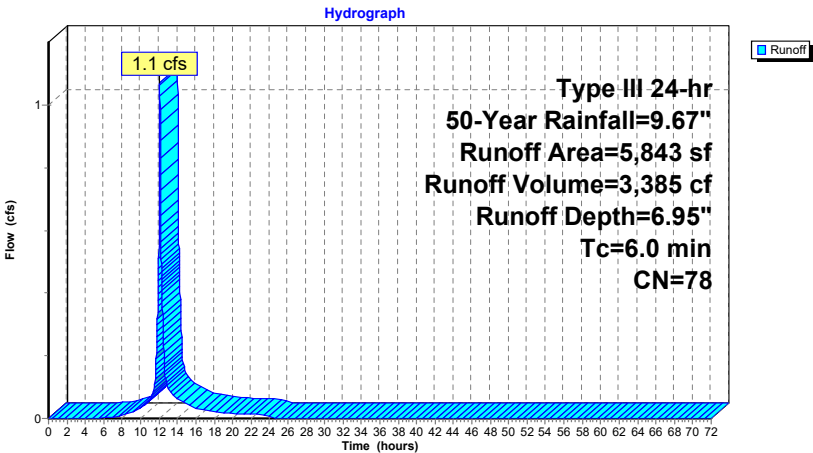
Runoff = 1.1 cfs @ 12.09 hrs, Volume= 3,385 cf, Depth= 6.95"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=9.67"

Area (sf)	CN	Description
1,056	98	Paved parking, HSG C
4,787	74	>75% Grass cover, Good, HSG C
5,843	78	Weighted Average
4,787		81.93% Pervious Area
1,056		18.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 7S: To Street



Summary for Pond 1P: Underground Infiltration System

Inflow Area = 69,430 sf, 74.25% Impervious, Inflow Depth = 8.65" for 50-Year event
Inflow = 10.3 cfs @ 12.09 hrs, Volume= 50,065 cf
Outflow = 3.7 cfs @ 12.39 hrs, Volume= 50,064 cf, Atten= 64%, Lag= 17.8 min
Discarded = 0.1 cfs @ 5.77 hrs, Volume= 20,187 cf
Primary = 3.6 cfs @ 12.39 hrs, Volume= 29,877 cf
Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.51' @ 12.39 hrs Surf.Area= 8,137 sf Storage= 17,597 cf

Plug-Flow detention time= 483.2 min calculated for 50,057 cf (100% of inflow)
Center-of-Mass det. time= 483.1 min (1,341.8 - 858.8)

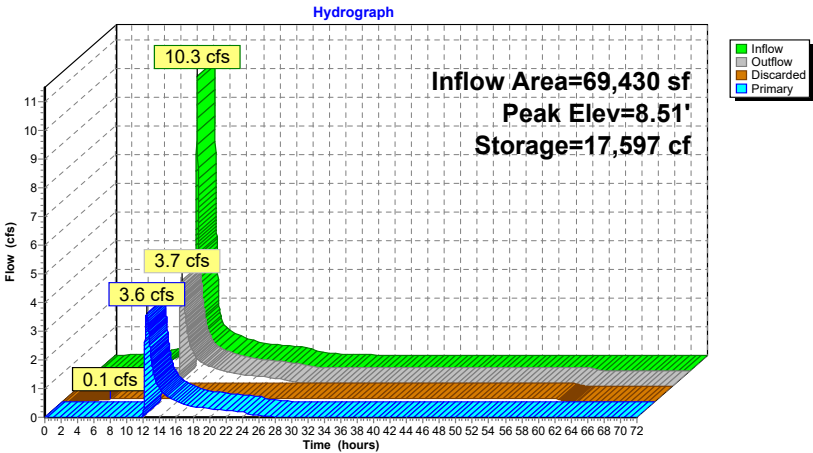
Volume	Invert	Avail.Storage	Storage Description
#1	6.00'	20,994 cf	6.89'W x 14.06'L x 3.00'H StormTrap ST-1 Units (Irregular Shape)x 48 24,412 cf Overall x 86.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	7.50'	15.0" Round Culvert L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.50' / 6.00' S= 0.0079 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.1 cfs @ 5.77 hrs HW=6.03' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=3.6 cfs @ 12.39 hrs HW=8.51' (Free Discharge)
2=Culvert (Barrel Controls 3.6 cfs @ 4.61 fps)

Pond 1P: Underground Infiltration System



Summary for Pond 2P: Rooftop Detention

Inflow Area = 18,785 sf, 100.00% Impervious, Inflow Depth = 9.43" for 50-Year event
Inflow = 4.1 cfs @ 12.08 hrs, Volume= 14,761 cf
Outflow = 0.3 cfs @ 13.14 hrs, Volume= 14,743 cf, Atten= 93%, Lag= 63.6 min
Primary = 0.3 cfs @ 13.14 hrs, Volume= 14,743 cf
Routed to Pond 1P : Underground Infiltration System

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 57.52' @ 13.14 hrs Surf.Area= 15,000 sf Storage= 7,804 cf

Plug-Flow detention time= 340.7 min calculated for 14,741 cf (100% of inflow)
Center-of-Mass det. time= 340.2 min (1,079.2 - 739.0)

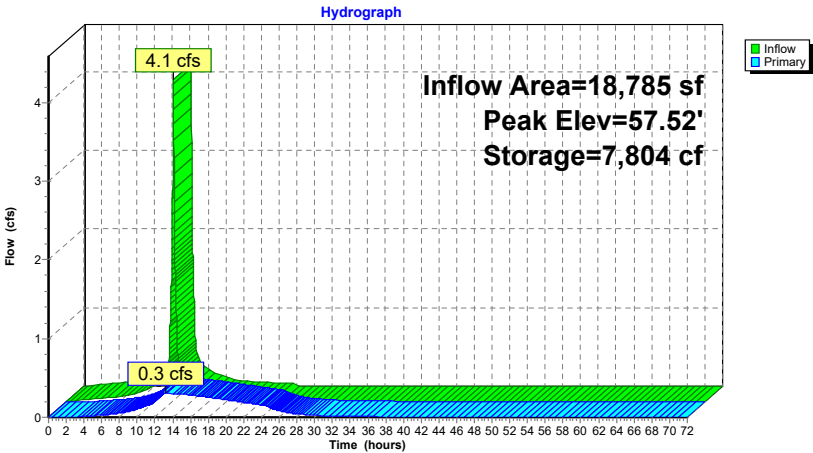
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,500 cf	Rooftop Detention (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	15,000	0	0
57.70	15,000	10,500	10,500

Device	Routing	Invert	Outlet Devices
#1	Primary	8.02'	12.0" Round Roof Drain L= 16.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 8.02' / 7.70' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	57.00'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.3 cfs @ 13.14 hrs HW=57.52' (Free Discharge)
1=Roof Drain (Passes 0.3 cfs of 23.4 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.3 cfs @ 3.47 fps)

Pond 2P: Rooftop Detention



Summary for Pond 3P: Rain garden

Inflow Area = 12,275 sf, 52.50% Impervious, Inflow Depth = 8.08" for 50-Year event
Inflow = 2.5 cfs @ 12.08 hrs, Volume= 8,268 cf
Outflow = 2.5 cfs @ 12.09 hrs, Volume= 8,268 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.0 cfs @ 12.09 hrs, Volume= 469 cf
Primary = 2.5 cfs @ 12.09 hrs, Volume= 7,799 cf
Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 6.43' @ 12.09 hrs Surf.Area= 422 sf Storage= 223 cf

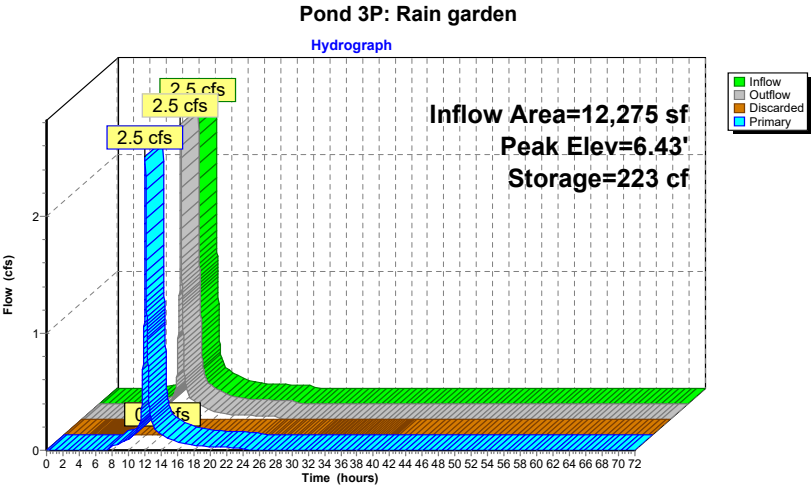
Plug-Flow detention time= 31.4 min calculated for 8,266 cf (100% of inflow)
Center-of-Mass det. time= 31.5 min (810.6 - 779.1)

Volume	Invert	Avail.Storage	Storage Description		
#1	5.60'	253 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
5.60	125	46.0	0	0	125
6.00	276	66.0	78	78	305
6.30	350	73.0	94	172	385
6.50	460	87.0	81	253	564

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.60'	0.520 in/hr Exfiltration over Surface area
#2	Primary	6.30'	22.0' long x 5.0' breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00			
2.50 3.00 3.50 4.00 4.50 5.00 5.50			
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65			
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88			

Discarded OutFlow Max=0.0 cfs @ 12.09 hrs HW=6.43' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=2.5 cfs @ 12.09 hrs HW=6.43' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 2.5 cfs @ 0.85 fps)



Summary for Pond 102P:

Inflow Area = 1,112 sf, 95.68% Impervious, Inflow Depth = 9.31" for 50-Year event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 863 cf
Outflow = 0.0 cfs @ 6.66 hrs, Volume= 860 cf, Atten= 99%, Lag= 0.0 min
Discarded = 0.0 cfs @ 6.66 hrs, Volume= 860 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.33' @ 19.27 hrs Surf.Area= 294 sf Storage= 617 cf

Plug-Flow detention time= 1,509.2 min calculated for 860 cf (100% of inflow)
Center-of-Mass det. time= 1,507.4 min (2,251.7 - 744.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

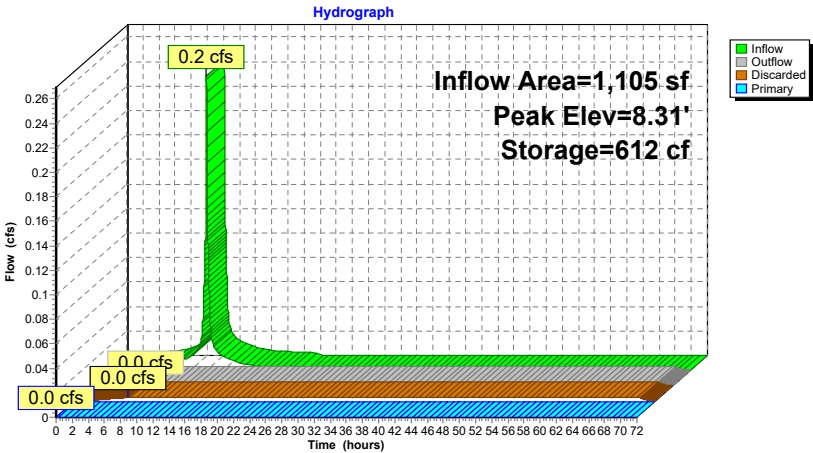
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 6.66 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 103P:



Summary for Pond 104P:

Inflow Area = 1,104 sf, 97.46% Impervious, Inflow Depth = 9.31" for 50-Year event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 856 cf
Outflow = 0.0 cfs @ 6.69 hrs, Volume= 855 cf, Atten= 99%, Lag= 0.0 min
Discarded = 0.0 cfs @ 6.69 hrs, Volume= 855 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.31' @ 19.21 hrs Surf.Area= 294 sf Storage= 611 cf

Plug-Flow detention time= 1,497.1 min calculated for 855 cf (100% of inflow)
Center-of-Mass det. time= 1,496.3 min (2,240.5 - 744.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

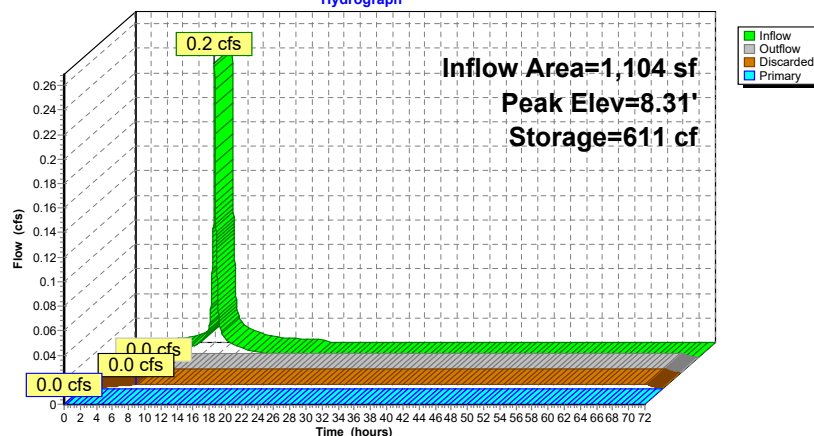
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 6.69 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Hydrograph



Summary for Pond 105P:

Inflow Area = 1,082 sf, 98.06% Impervious, Inflow Depth = 9.43" for 50-Year event
 Inflow = 0.2 cfs @ 12.08 hrs, Volume= 850 cf
 Outflow = 0.0 cfs @ 6.51 hrs, Volume= 850 cf, Atten= 99%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 6.51 hrs, Volume= 850 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.27' @ 19.02 hrs Surf.Area= 294 sf Storage= 600 cf

Plug-Flow detention time= 1,462.7 min calculated for 850 cf (100% of inflow)
Center-of-Mass det. time= 1,462.5 min (2,201.5 - 739.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area 6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	10.00'	

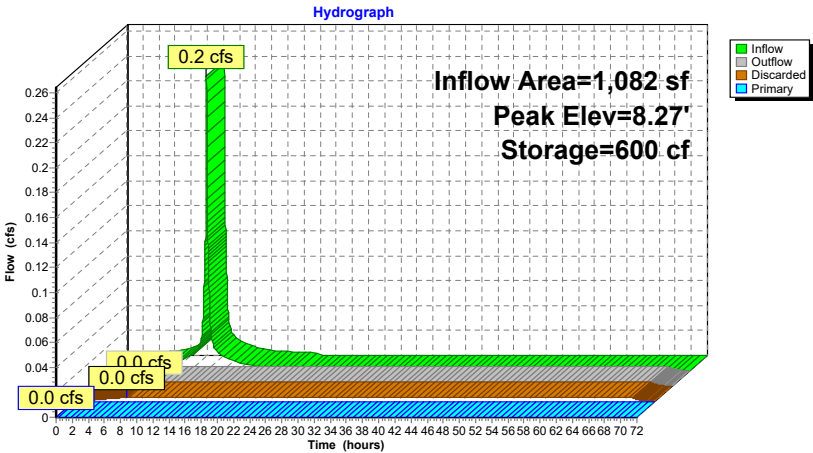
Discarded OutFlow Max=0.0 cfs @ 6.51 hrs HW=6.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)

2=Orifice/Grate (Controls 0.0 cfs)

Pond 105P:



Summary for Pond 106P:

Inflow Area = 1,056 sf, 99.24% Impervious, Inflow Depth = 9.43" for 50-Year event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 830 cf
Outflow = 0.0 cfs @ 6.62 hrs, Volume= 830 cf, Atten= 98%, Lag= 0.0 min
Discarded = 0.0 cfs @ 6.62 hrs, Volume= 830 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.20' @ 18.78 hrs Surf.Area= 294 sf Storage= 582 cf

Plug-Flow detention time= 1,419.6 min calculated for 830 cf (100% of inflow)
Center-of-Mass det. time= 1,419.8 min (2,158.8 - 739.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

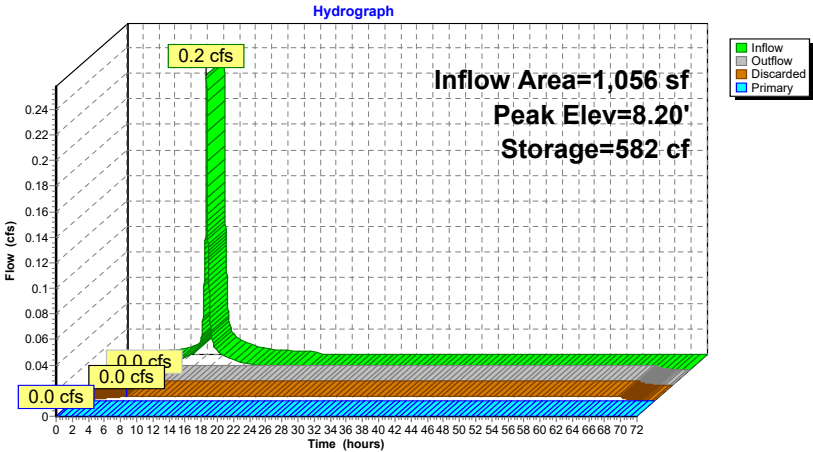
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 6.62 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 106P:

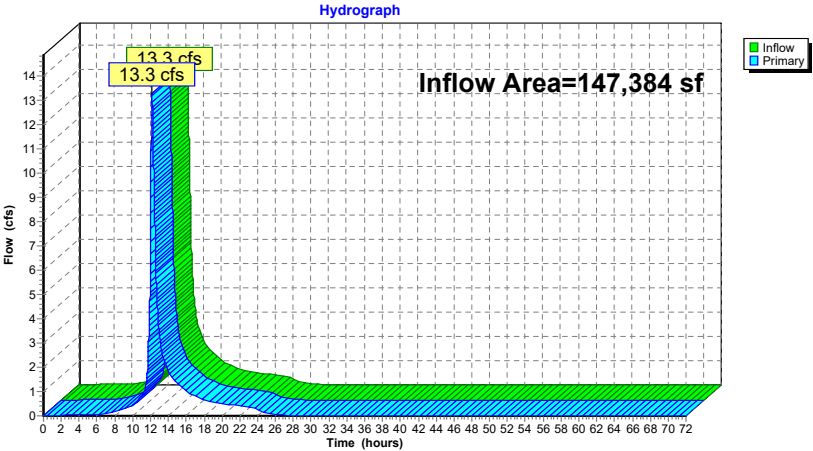


Summary for Link 1L: Towards Wetlands

Inflow Area = 147,384 sf, 49.02% Impervious, Inflow Depth = 6.23" for 50-Year event
Inflow = 13.3 cfs @ 12.15 hrs, Volume= 76,458 cf
Primary = 13.3 cfs @ 12.15 hrs, Volume= 76,458 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

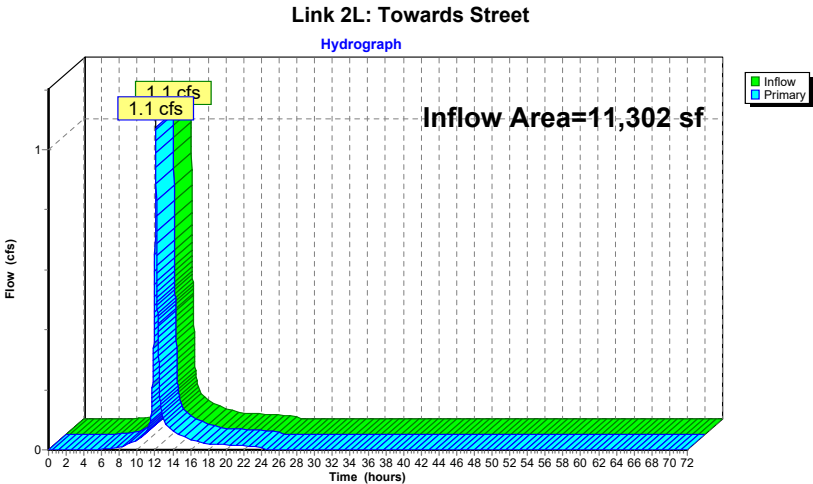
Link 1L: Towards Wetlands



Summary for Link 2L: Towards Street

Inflow Area = 11,302 sf, 56.45% Impervious, Inflow Depth = 3.59" for 50-Year event
Inflow = 1.1 cfs @ 12.09 hrs, Volume= 3,385 cf
Primary = 1.1 cfs @ 12.09 hrs, Volume= 3,385 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

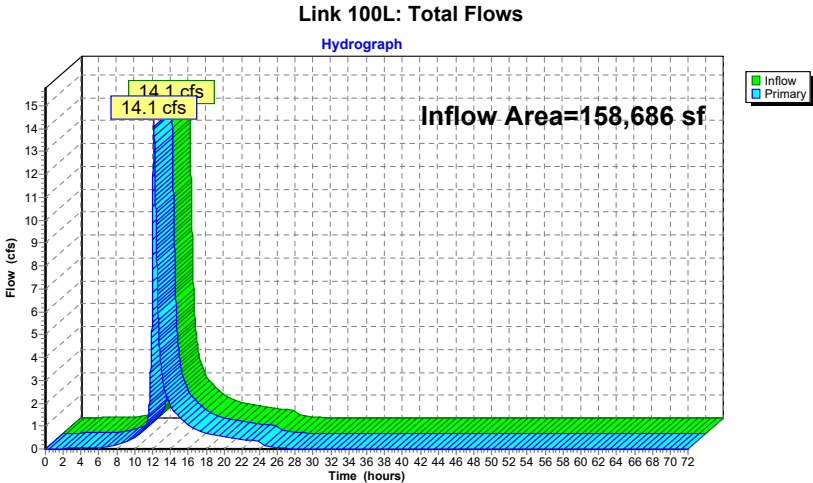
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs



Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 49.55% Impervious, Inflow Depth = 6.04" for 50-Year event
Inflow = 14.1 cfs @ 12.15 hrs, Volume= 79,844 cf
Primary = 14.1 cfs @ 12.15 hrs, Volume= 79,844 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs



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Type III 24-hr 100-Year Rainfall=11.50"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CB-1	Runoff Area=22,742 sf 72.16% Impervious Runoff Depth=10.39" Tc=6.0 min CN=91 Runoff=5.8 cfs 19,696 cf
Subcatchment 2.1S: Building	Runoff Area=14,140 sf 100.00% Impervious Runoff Depth=11.26" Tc=6.0 min CN=98 Runoff=3.7 cfs 13,266 cf
Subcatchment 2S: Building Roof	Runoff Area=18,785 sf 100.00% Impervious Runoff Depth=11.26" Tc=6.0 min CN=98 Runoff=4.9 cfs 17,625 cf
Subcatchment 3.1S: Backyard ADs	Runoff Area=8,985 sf 3.03% Impervious Runoff Depth=8.28" Flow Length=147' Tc=10.3 min CN=75 Runoff=1.7 cfs 6,203 cf
Subcatchment 3S: Townhouse Roofs	Runoff Area=13,067 sf 100.00% Impervious Runoff Depth=11.26" Tc=6.0 min CN=98 Runoff=3.4 cfs 12,260 cf
Subcatchment 4.2S: Townhouse TDs	Runoff Area=1,112 sf 95.68% Impervious Runoff Depth=11.14" Tc=6.0 min CN=97 Runoff=0.3 cfs 1,032 cf
Subcatchment 4.3S: Townhouse TDs	Runoff Area=1,105 sf 97.29% Impervious Runoff Depth=11.14" Tc=6.0 min CN=97 Runoff=0.3 cfs 1,026 cf
Subcatchment 4.4S: Townhouse TDs	Runoff Area=1,104 sf 97.46% Impervious Runoff Depth=11.14" Tc=6.0 min CN=97 Runoff=0.3 cfs 1,025 cf
Subcatchment 4.5S: Townhouse TDs	Runoff Area=1,082 sf 98.06% Impervious Runoff Depth=11.26" Tc=6.0 min CN=98 Runoff=0.3 cfs 1,015 cf
Subcatchment 4.6S: Townhouse TDs	Runoff Area=1,056 sf 99.24% Impervious Runoff Depth=11.26" Tc=6.0 min CN=98 Runoff=0.3 cfs 991 cf
Subcatchment 5S: TD-1	Runoff Area=5,851 sf 51.63% Impervious Runoff Depth=9.75" Tc=6.0 min CN=86 Runoff=1.4 cfs 4,756 cf
Subcatchment 6.1S: East driveway	Runoff Area=12,275 sf 52.50% Impervious Runoff Depth=9.88" Tc=6.0 min CN=87 Runoff=3.0 cfs 10,109 cf
Subcatchment 6S: Bypass Towards	Runoff Area=51,539 sf 0.21% Impervious Runoff Depth=8.15" Flow Length=125' Tc=14.0 min CN=74 Runoff=8.7 cfs 34,988 cf
Subcatchment 7S: To Street	Runoff Area=5,843 sf 18.07% Impervious Runoff Depth=8.69" Tc=6.0 min CN=78 Runoff=1.3 cfs 4,233 cf
Pond 1P: Underground Infiltration System	Peak Elev=8.86' Storage=20,001 cf Inflow=12.3 cfs 60,519 cf Discarded=0.1 cfs 20,937 cf Primary=5.1 cfs 39,581 cf Outflow=5.2 cfs 60,518 cf
Pond 2P: Rooftop Detention	Peak Elev=57.63' Storage=9,434 cf Inflow=4.9 cfs 17,625 cf Outflow=0.3 cfs 17,604 cf

2340702-PR

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Type III 24-hr 100-Year Rainfall=11.50"

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Pond 3P: Rain garden	Peak Elev=6.45' Storage=231 cf Inflow=3.0 cfs 10,109 cf Discarded=0.0 cfs 480 cf Primary=3.0 cfs 9,630 cf Outflow=3.0 cfs 10,109 cf
Pond 102P:	Peak Elev=8.91' Storage=770 cf Inflow=0.3 cfs 1,032 cf Discarded=0.0 cfs 878 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 878 cf
Pond 103P:	Peak Elev=8.89' Storage=764 cf Inflow=0.3 cfs 1,026 cf Discarded=0.0 cfs 878 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 878 cf
Pond 104P:	Peak Elev=8.88' Storage=763 cf Inflow=0.3 cfs 1,025 cf Discarded=0.0 cfs 878 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 878 cf
Pond 105P:	Peak Elev=8.83' Storage=749 cf Inflow=0.3 cfs 1,015 cf Discarded=0.0 cfs 883 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 883 cf
Pond 106P:	Peak Elev=8.75' Storage=726 cf Inflow=0.3 cfs 991 cf Discarded=0.0 cfs 882 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 882 cf
Link 1L: Towards Wetlands	Inflow=17.9 cfs 97,465 cf Primary=17.9 cfs 97,465 cf
Link 2L: Towards Street	Inflow=1.3 cfs 4,233 cf Primary=1.3 cfs 4,233 cf
Link 100L: Total Flows	Inflow=19.0 cfs 101,698 cf Primary=19.0 cfs 101,698 cf
Total Runoff Area = 158,686 sf Runoff Volume = 128,224 cf Average Runoff Depth = 9.70" 50.45% Pervious = 80,060 sf 49.55% Impervious = 78,626 sf	

Summary for Subcatchment 1S: CB-1

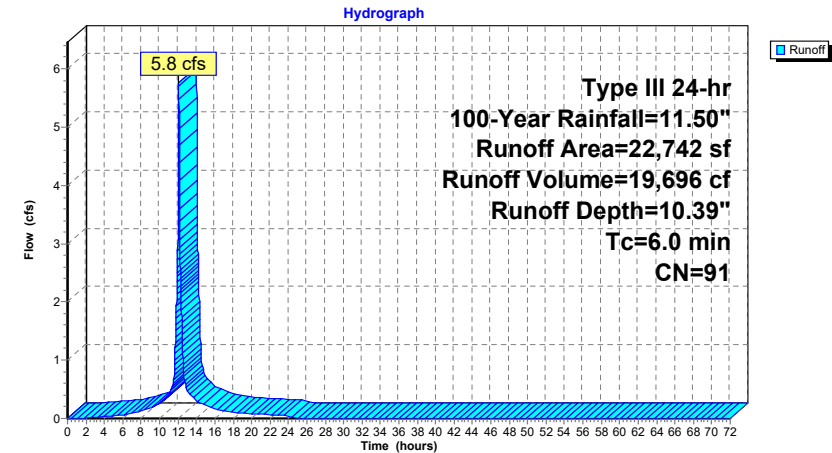
Runoff = 5.8 cfs @ 12.08 hrs, Volume= 19,696 cf, Depth=10.39"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
16,410	98	Paved parking, HSG C
6,332	74	>75% Grass cover, Good, HSG C
22,742	91	Weighted Average
6,332		27.84% Pervious Area
16,410		72.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 1S: CB-1



Summary for Subcatchment 2.1S: Building Roof-Southeast

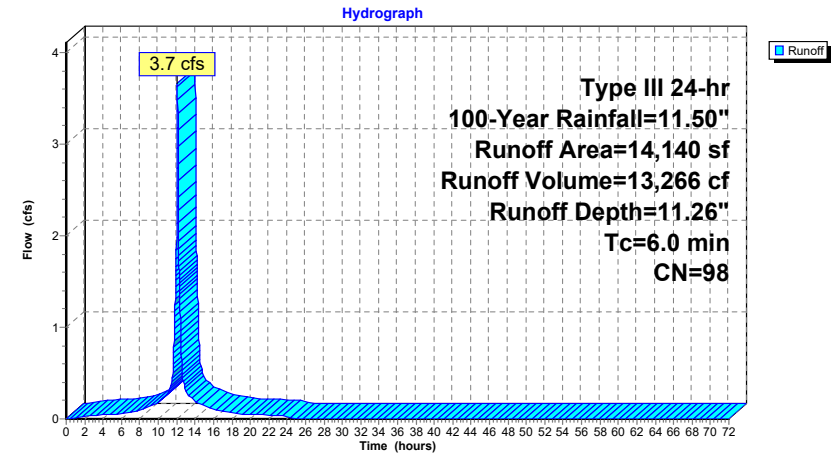
Runoff = 3.7 cfs @ 12.08 hrs, Volume= 13,266 cf, Depth=11.26"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
14,140	98	Roofs, HSG C
14,140		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2.1S: Building Roof-Southeast



Summary for Subcatchment 2S: Building Roof

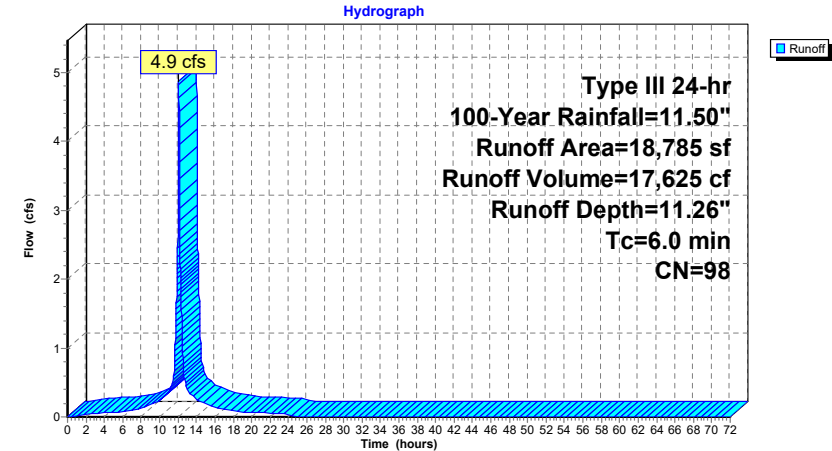
Runoff = 4.9 cfs @ 12.08 hrs, Volume= 17,625 cf, Depth=11.26"
Routed to Pond 2P : Rooftop Detention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
18,785	98	Roofs, HSG C
18,785		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 2S: Building Roof



Summary for Subcatchment 3.1S: Backyard ADs

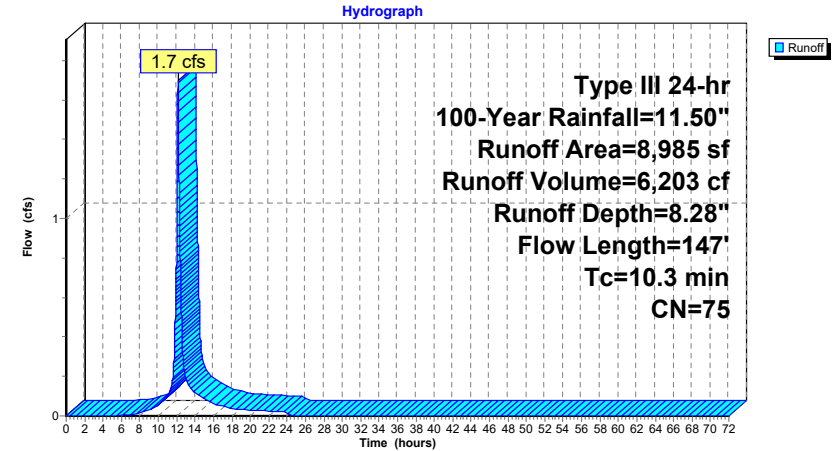
Runoff = 1.7 cfs @ 12.14 hrs, Volume= 6,203 cf, Depth= 8.28"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
272	98	Unconnected pavement, HSG C
8,302	74	>75% Grass cover, Good, HSG C
411	89	Gravel sidewalk, HSG C
8,985	75	Weighted Average
8,713		96.97% Pervious Area
272		3.03% Impervious Area
272		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0142	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.23"
0.9	97	0.0154	1.86		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
10.3	147				Total

Subcatchment 3.1S: Backyard ADs



Summary for Subcatchment 3S: Townhouse Roofs

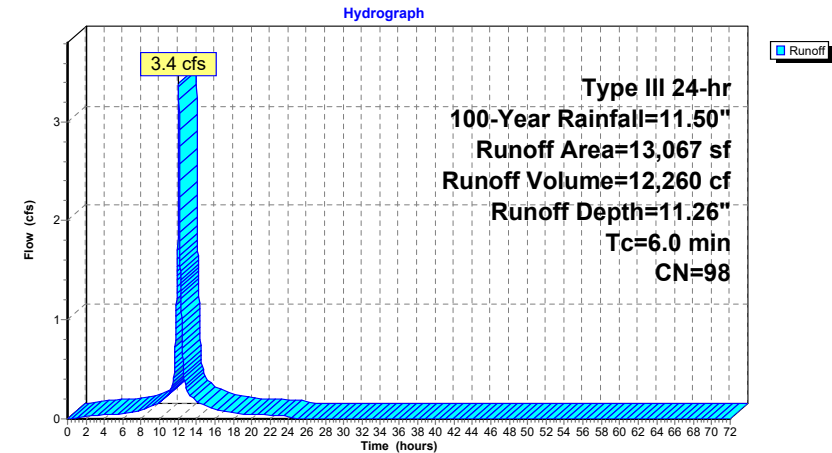
Runoff = 3.4 cfs @ 12.08 hrs, Volume= 12,260 cf, Depth=11.26"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
13,067	98	Roofs, HSG C
13,067		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 3S: Townhouse Roofs



Summary for Subcatchment 4.2S: Townhouse TDs

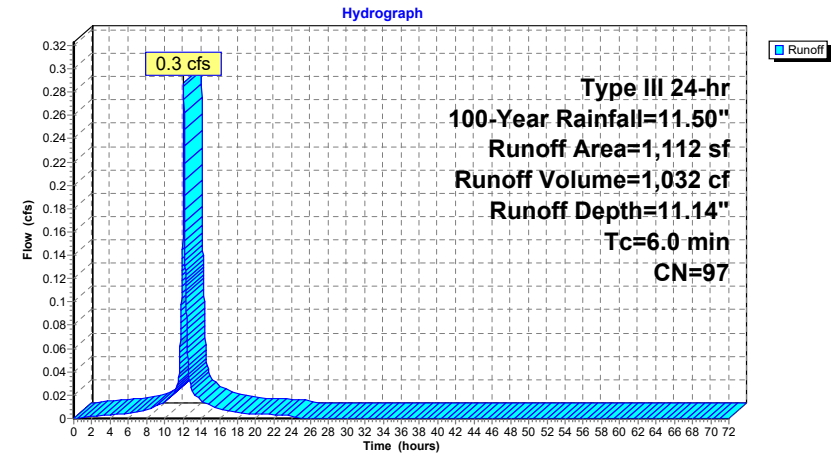
Runoff = 0.3 cfs @ 12.08 hrs, Volume= 1,032 cf, Depth=11.14"
Routed to Pond 102P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
1,064	98	Paved parking, HSG C
48	74	>75% Grass cover, Good, HSG C
1,112	97	Weighted Average
48		4.32% Pervious Area
1,064		95.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.2S: Townhouse TDs



Summary for Subcatchment 4.3S: Townhouse TDs

Runoff = 0.3 cfs @ 12.08 hrs, Volume= 1,026 cf, Depth=11.14"
Routed to Pond 103P :

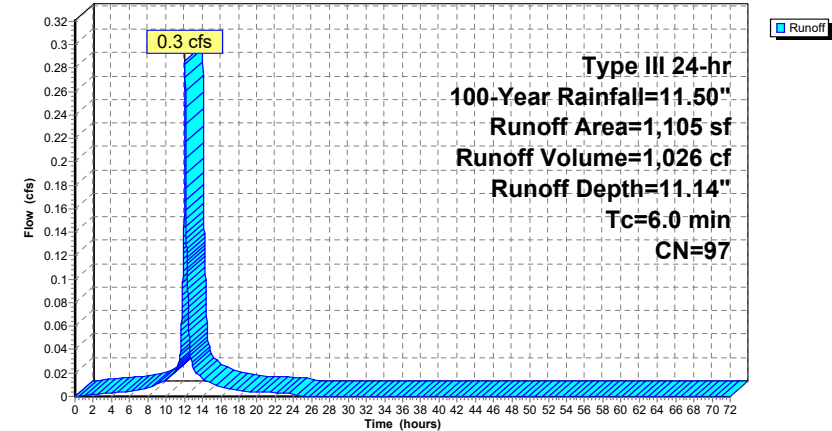
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
1,075	98	Paved parking, HSG C
30	74	>75% Grass cover, Good, HSG C
1,105	97	Weighted Average
30		2.71% Pervious Area
1,075		97.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.3S: Townhouse TDs

Hydrograph



Summary for Subcatchment 4.4S: Townhouse TDs

Runoff = 0.3 cfs @ 12.08 hrs, Volume= 1,025 cf, Depth=11.14"
Routed to Pond 104P :

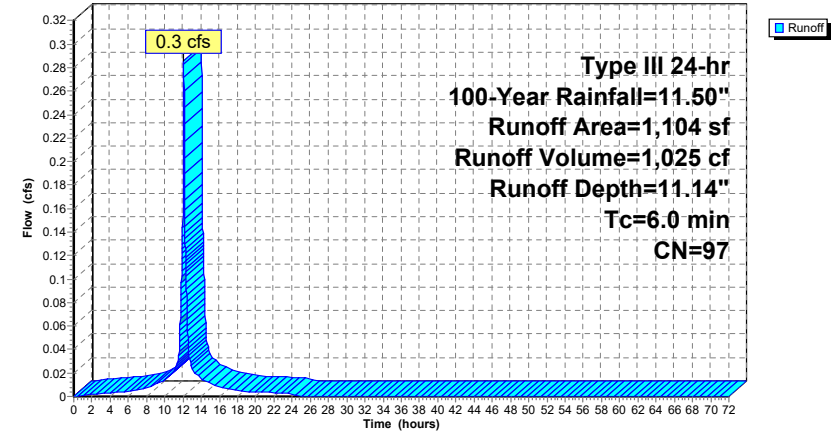
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
1,076	98	Paved parking, HSG C
28	74	>75% Grass cover, Good, HSG C
1,104	97	Weighted Average
28		2.54% Pervious Area
1,076		97.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.4S: Townhouse TDs

Hydrograph



Summary for Subcatchment 4.5S: Townhouse TDs

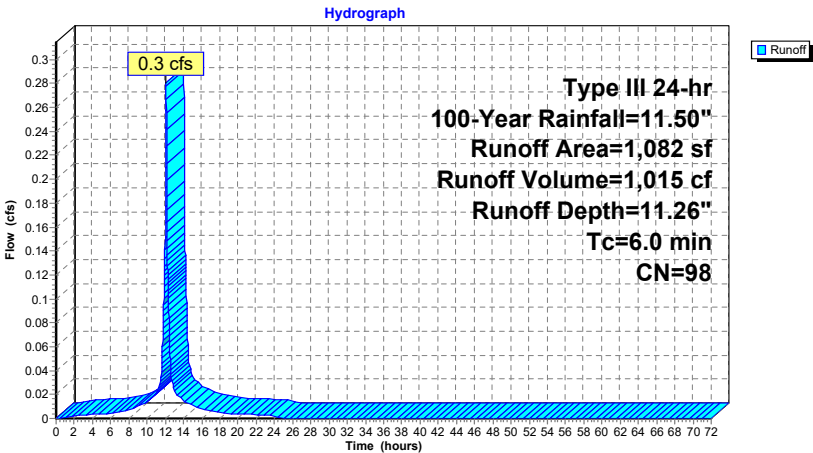
Runoff = 0.3 cfs @ 12.08 hrs, Volume= 1,015 cf, Depth=11.26"
Routed to Pond 105P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
1,061	98	Paved parking, HSG C
21	74	>75% Grass cover, Good, HSG C
1,082	98	Weighted Average
21		1.94% Pervious Area
1,061		98.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.5S: Townhouse TDs



Summary for Subcatchment 4.6S: Townhouse TDs

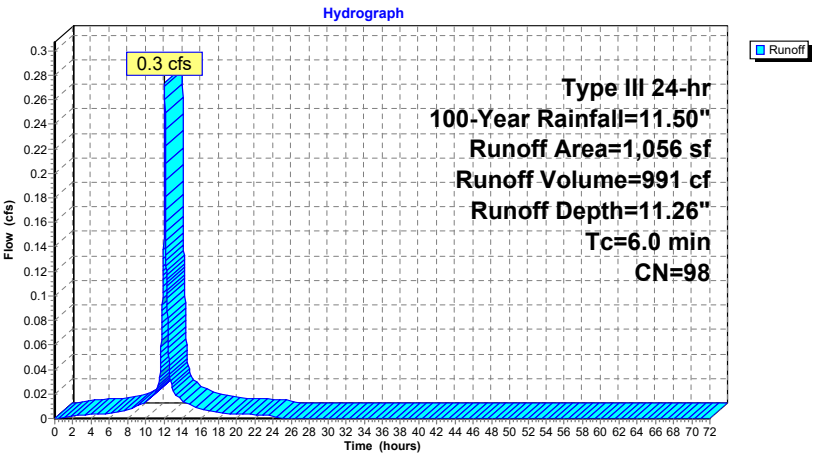
Runoff = 0.3 cfs @ 12.08 hrs, Volume= 991 cf, Depth=11.26"
Routed to Pond 106P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
1,048	98	Paved parking, HSG C
8	74	>75% Grass cover, Good, HSG C
1,056	98	Weighted Average
8		0.76% Pervious Area
1,048		99.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 4.6S: Townhouse TDs



Summary for Subcatchment 5S: TD-1

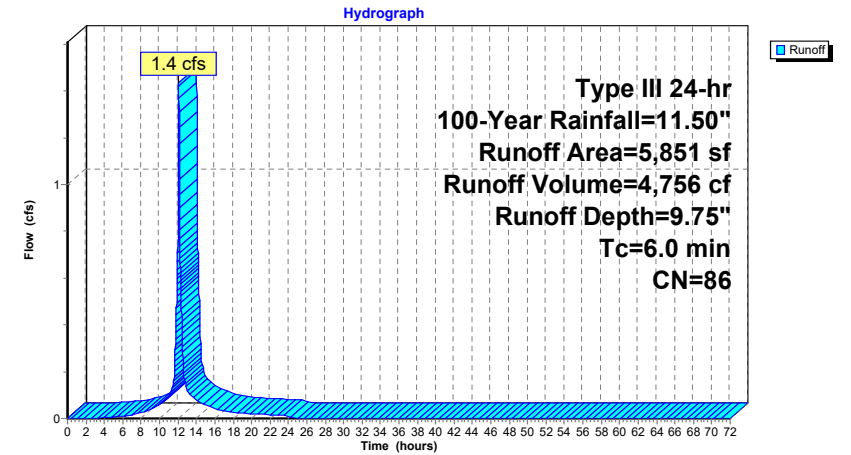
Runoff = 1.4 cfs @ 12.08 hrs, Volume= 4,756 cf, Depth= 9.75"
Routed to Pond 1P : Underground Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
3,021	98	Paved parking, HSG C
2,830	74	>75% Grass cover, Good, HSG C
5,851	86	Weighted Average
2,830		48.37% Pervious Area
3,021		51.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc

Subcatchment 5S: TD-1



Summary for Subcatchment 6.1S: East driveway

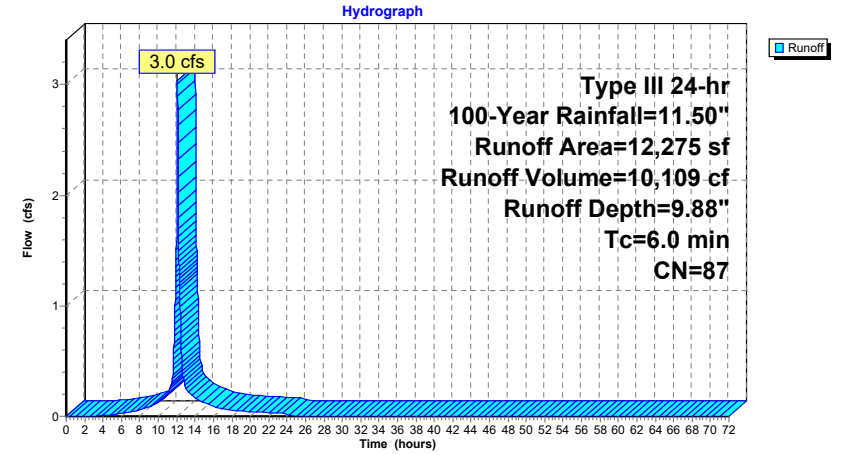
Runoff = 3.0 cfs @ 12.08 hrs, Volume= 10,109 cf, Depth= 9.88"
Routed to Pond 3P : Rain garden

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
5,611	74	>75% Grass cover, Good, HSG C
6,444	98	Paved roads w/curbs & sewers, HSG C
220	89	Gravel roads, HSG C
12,275	87	Weighted Average
5,831		47.50% Pervious Area
6,444		52.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 6.1S: East driveway



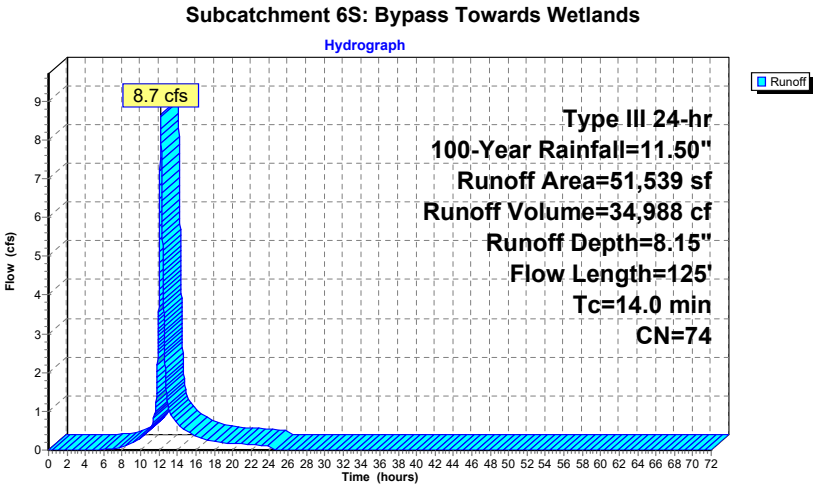
Summary for Subcatchment 6S: Bypass Towards Wetlands

Runoff = 8.7 cfs @ 12.18 hrs, Volume= 34,988 cf, Depth= 8.15"
Routed to Link 1L : Towards Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
4,985	70	Woods, Good, HSG C
46,447	74	>75% Grass cover, Good, HSG C
107	98	Roofs, HSG C
51,539	74	Weighted Average
51,432		99.79% Pervious Area
107		0.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0220	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.23"
2.2	75	0.0133	0.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.0	125	Total			



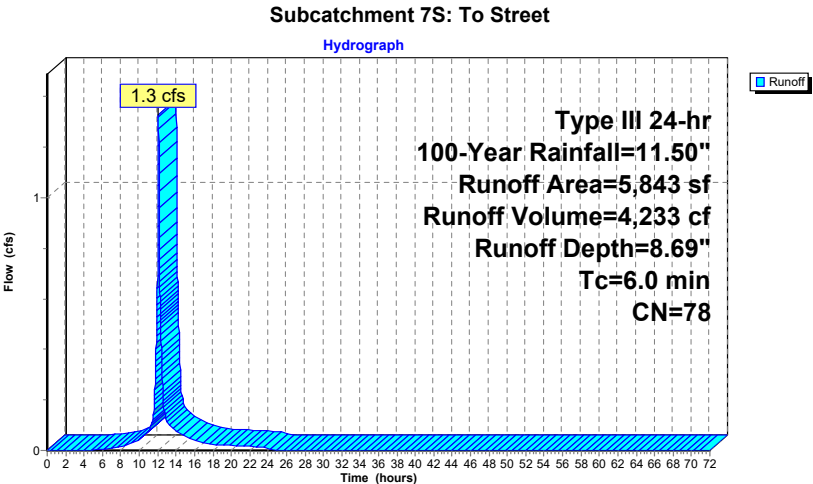
Summary for Subcatchment 7S: To Street

Runoff = 1.3 cfs @ 12.09 hrs, Volume= 4,233 cf, Depth= 8.69"
Routed to Link 2L : Towards Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=11.50"

Area (sf)	CN	Description
1,056	98	Paved parking, HSG C
4,787	74	>75% Grass cover, Good, HSG C
5,843	78	Weighted Average
4,787		81.93% Pervious Area
1,056		18.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. Tc



Summary for Pond 1P: Underground Infiltration System

Inflow Area = 69,430 sf, 74.25% Impervious, Inflow Depth = 10.46" for 100-Year event
Inflow = 12.3 cfs @ 12.09 hrs, Volume= 60,519 cf
Outflow = 5.2 cfs @ 12.33 hrs, Volume= 60,518 cf, Atten= 58%, Lag= 14.3 min
Discarded = 0.1 cfs @ 4.84 hrs, Volume= 20,937 cf
Primary = 5.1 cfs @ 12.33 hrs, Volume= 39,581 cf
Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.86' @ 12.33 hrs Surf.Area= 8,137 sf Storage= 20,001 cf

Plug-Flow detention time= 427.6 min calculated for 60,509 cf (100% of inflow)
Center-of-Mass det. time= 427.5 min (1,289.1 - 861.5)

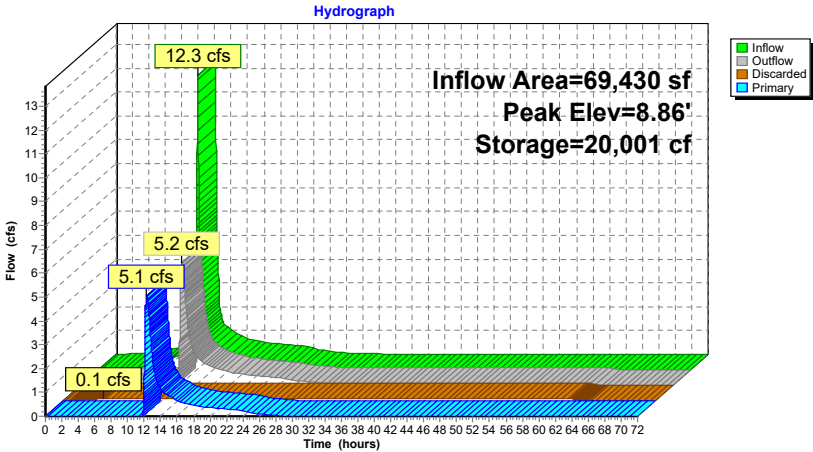
Volume	Invert	Avail.Storage	Storage Description
#1	6.00'	20,994 cf	6.89'W x 14.06'L x 3.00'H StormTrap ST-1 Units (Irregular Shape)x 84 24,412 cf Overall x 86.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	7.50'	15.0" Round Culvert L= 190.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 7.50' / 6.00' S= 0.0079 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.1 cfs @ 4.84 hrs HW=6.03' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=5.1 cfs @ 12.33 hrs HW=8.86' (Free Discharge)
2=Culvert (Inlet Controls 5.1 cfs @ 4.12 fps)

Pond 1P: Underground Infiltration System



Summary for Pond 2P: Rooftop Detention

Inflow Area = 18,785 sf, 100.00% Impervious, Inflow Depth = 11.26" for 100-Year event
Inflow = 4.9 cfs @ 12.08 hrs, Volume= 17,625 cf
Outflow = 0.3 cfs @ 13.36 hrs, Volume= 17,604 cf, Atten= 93%, Lag= 76.4 min
Primary = 0.3 cfs @ 13.36 hrs, Volume= 17,604 cf
Routed to Pond 1P : Underground Infiltration System

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 57.63' @ 13.36 hrs Surf.Area= 15,000 sf Storage= 9,434 cf

Plug-Flow detention time= 365.0 min calculated for 17,604 cf (100% of inflow)
Center-of-Mass det. time= 364.1 min (1,101.4 - 737.2)

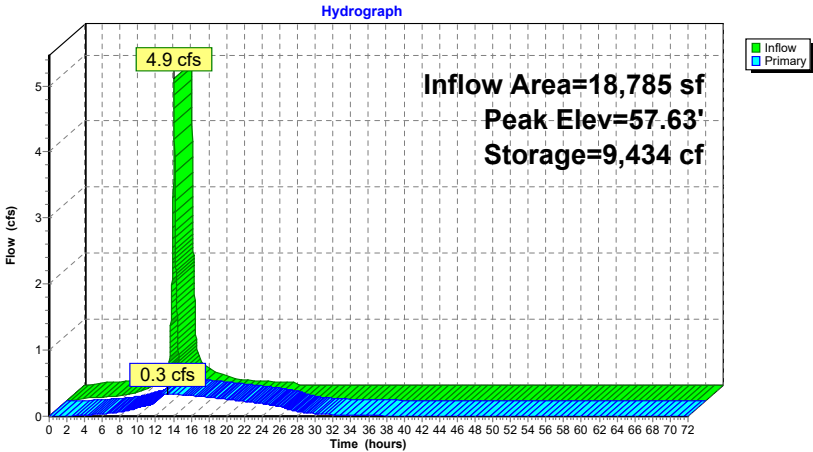
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,500 cf	Rooftop Detention (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	15,000	0	0
57.70	15,000	10,500	10,500

Device	Routing	Invert	Outlet Devices
#1	Primary	8.02'	12.0" Round Roof Drain L= 16.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 8.02' / 7.70' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	57.00'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.3 cfs @ 13.36 hrs HW=57.63' (Free Discharge)
1=Roof Drain (Passes 0.3 cfs of 23.4 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.3 cfs @ 3.82 fps)

Pond 2P: Rooftop Detention



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Type III 24-hr 100-Year Rainfall=11.50"

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Summary for Pond 3P: Rain garden

Inflow Area = 12,275 sf, 52.50% Impervious, Inflow Depth = 9.88" for 100-Year event
 Inflow = 3.0 cfs @ 12.08 hrs, Volume= 10,109 cf
 Outflow = 3.0 cfs @ 12.09 hrs, Volume= 10,109 cf, Atten= 0%, Lag= 0.2 min
 Discarded = 0.0 cfs @ 12.09 hrs, Volume= 480 cf
 Primary = 3.0 cfs @ 12.09 hrs, Volume= 9,630 cf
 Routed to Link 1L : Towards Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 6.45' @ 12.09 hrs Surf.Area= 432 sf Storage= 231 cf

Plug-Flow detention time= 26.5 min calculated for 10,108 cf (100% of inflow)

Center-of-Mass det. time= 26.6 min (800.6 - 774.0)

Volume	Invert	Avail.Storage	Storage Description			
#1	5.60'	253 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
5.60	125	46.0	0	0	125	
6.00	276	66.0	78	78	305	
6.30	350	73.0	94	172	385	
6.50	460	87.0	81	253	564	

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.60'	0.520 in/hr Exfiltration over Surface area
#2	Primary	6.30'	22.0' long x 5.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
			2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
			2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.0 cfs @ 12.09 hrs HW=6.45' (Free Discharge)↳ **1=Exfiltration** (Exfiltration Controls 0.0 cfs)**Primary OutFlow** Max=3.0 cfs @ 12.09 hrs HW=6.45' (Free Discharge)↳ **2=Broad-Crested Rectangular Weir** (Weir Controls 3.0 cfs @ 0.91 fps)**2340702-PR**

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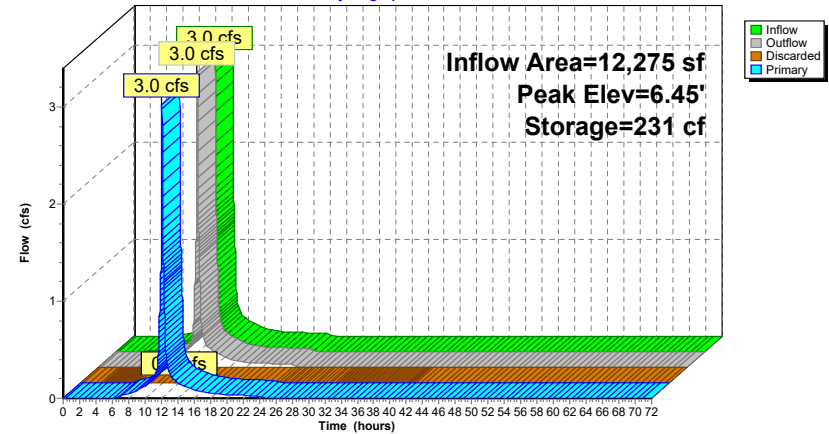
Type III 24-hr 100-Year Rainfall=11.50"

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Pond 3P: Rain garden

Hydrograph



Summary for Pond 102P:

Inflow Area = 1,112 sf, 95.68% Impervious, Inflow Depth = 11.14" for 100-Year event
Inflow = 0.3 cfs @ 12.08 hrs, Volume= 1,032 cf
Outflow = 0.0 cfs @ 5.54 hrs, Volume= 878 cf, Atten= 99%, Lag= 0.0 min
Discarded = 0.0 cfs @ 5.54 hrs, Volume= 878 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.91' @ 21.02 hrs Surf.Area= 294 sf Storage= 770 cf

Plug-Flow detention time= 1,574.6 min calculated for 878 cf (85% of inflow)
Center-of-Mass det. time= 1,509.1 min (2,251.0 - 741.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97"L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97"L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

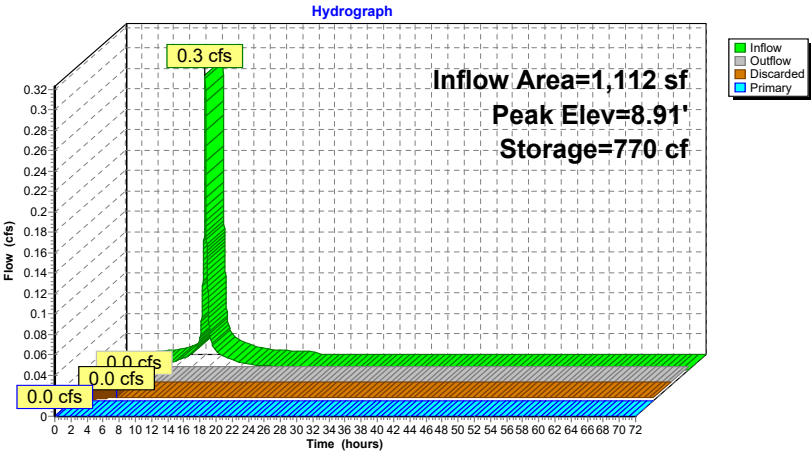
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 5.54 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 102P:



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Type III 24-hr 100-Year Rainfall=11.50"

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Summary for Pond 103P:

Inflow Area = 1,105 sf, 97.29% Impervious, Inflow Depth = 11.14" for 100-Year event
 Inflow = 0.3 cfs @ 12.08 hrs, Volume= 1,026 cf
 Outflow = 0.0 cfs @ 5.58 hrs, Volume= 878 cf, Atten= 99%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 5.58 hrs, Volume= 878 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 8.89' @ 20.95 hrs Surf.Area= 294 sf Storage= 764 cf

Plug-Flow detention time= 1,573.6 min calculated for 878 cf (86% of inflow)
 Center-of-Mass det. time= 1,509.6 min (2,251.5 - 741.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 5.58 hrs HW=6.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)

2=Orifice/Grate (Controls 0.0 cfs)

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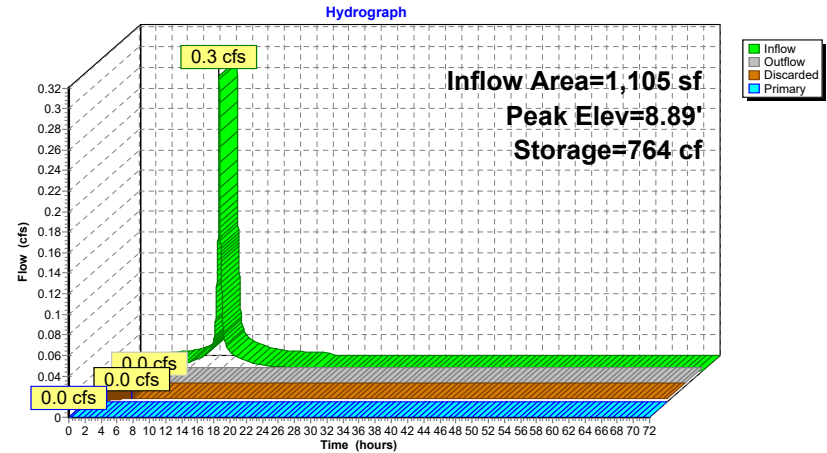
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Type III 24-hr 100-Year Rainfall=11.50"

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Pond 103P:

Summary for Pond 104P:

Inflow Area = 1,104 sf, 97.46% Impervious, Inflow Depth = 11.14" for 100-Year event
Inflow = 0.3 cfs @ 12.08 hrs, Volume= 1,025 cf
Outflow = 0.0 cfs @ 5.59 hrs, Volume= 878 cf, Atten= 99%, Lag= 0.0 min
Discarded = 0.0 cfs @ 5.59 hrs, Volume= 878 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.88' @ 20.94 hrs Surf.Area= 294 sf Storage= 763 cf

Plug-Flow detention time= 1,573.5 min calculated for 878 cf (86% of inflow)
Center-of-Mass det. time= 1,509.6 min (2,251.5 - 741.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97"L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97"L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

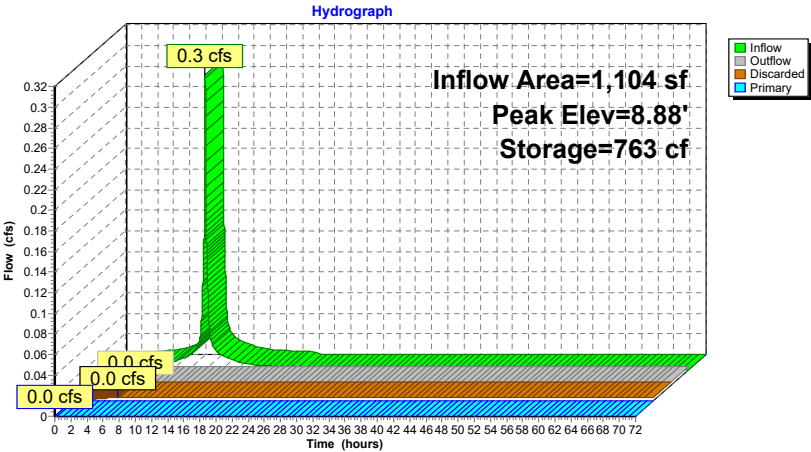
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 5.59 hrs HW=6.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)
2=Orifice/Grate (Controls 0.0 cfs)

Pond 104P:



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Type III 24-hr 100-Year Rainfall=11.50"

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Summary for Pond 105P:

Inflow Area = 1,082 sf, 98.06% Impervious, Inflow Depth = 11.26" for 100-Year event
 Inflow = 0.3 cfs @ 12.08 hrs, Volume= 1,015 cf
 Outflow = 0.0 cfs @ 5.25 hrs, Volume= 883 cf, Atten= 99%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 5.25 hrs, Volume= 883 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 8.83' @ 20.73 hrs Surf.Area= 294 sf Storage= 749 cf

Plug-Flow detention time= 1,562.1 min calculated for 883 cf (87% of inflow)
 Center-of-Mass det. time= 1,501.9 min (2,239.1 - 737.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97"L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97"L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 5.25 hrs HW=6.04' (Free Discharge)↳ **1=Exfiltration** (Exfiltration Controls 0.0 cfs)**Primary OutFlow** Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)↳ **2=Orifice/Grate** (Controls 0.0 cfs)**2340702-PR**

Prepared by BSC Group

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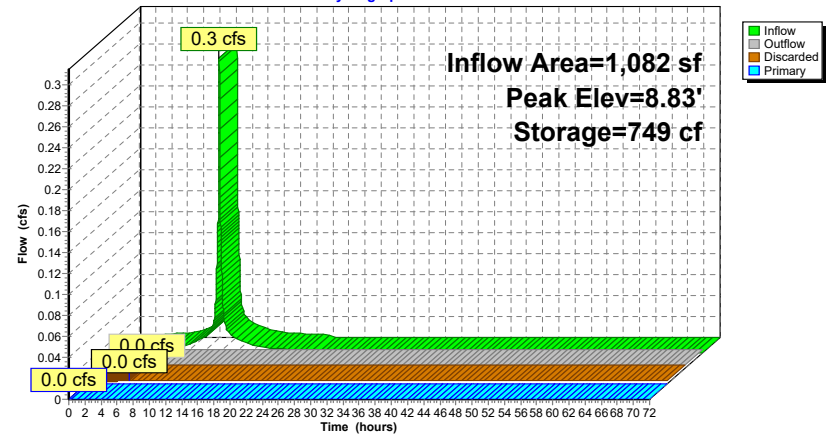
Type III 24-hr 100-Year Rainfall=11.50"

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Pond 105P:

Hydrograph



2340702-PR

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Type III 24-hr 100-Year Rainfall=11.50"

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Summary for Pond 106P:

Inflow Area = 1,056 sf, 99.24% Impervious, Inflow Depth = 11.26" for 100-Year event
 Inflow = 0.3 cfs @ 12.08 hrs, Volume= 991 cf
 Outflow = 0.0 cfs @ 5.41 hrs, Volume= 882 cf, Atten= 99%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 5.41 hrs, Volume= 882 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 2L : Towards Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 8.75' @ 20.46 hrs Surf.Area= 294 sf Storage= 726 cf

Plug-Flow detention time= 1,557.7 min calculated for 882 cf (89% of inflow)
 Center-of-Mass det. time= 1,503.8 min (2,241.0 - 737.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0 cf	21.33'W x 13.78'L x 2.95'H Field A 868 cf Overall - 868 cf Embedded = 0 cf x 40.0% Voids
#2A	6.00'	781 cf	Ferguson R-Tank XD 18 x 91 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97"L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97"L = 9.5 cf 91 Chambers in 13 Rows
		781 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	0.520 in/hr Exfiltration over Surface area
#2	Primary	10.00'	6.0" x 240.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.0 cfs @ 5.41 hrs HW=6.04' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=6.00' (Free Discharge)

2=Orifice/Grate (Controls 0.0 cfs)

2340702-PR

Prepared by BSC Group

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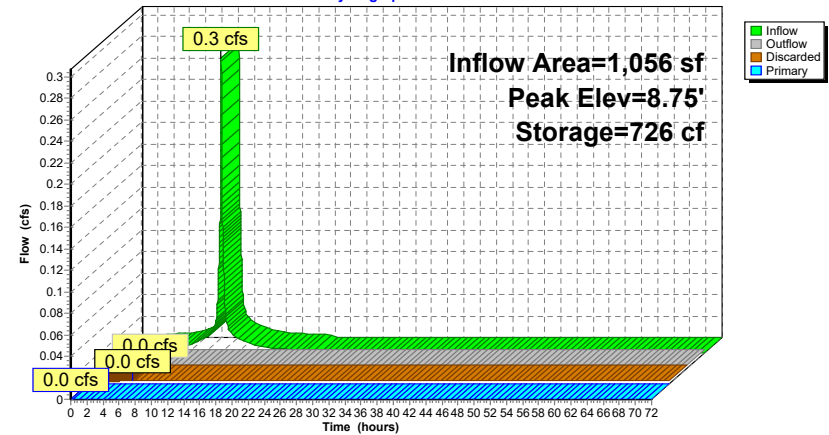
Type III 24-hr 100-Year Rainfall=11.50"

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Pond 106P:

Hydrograph

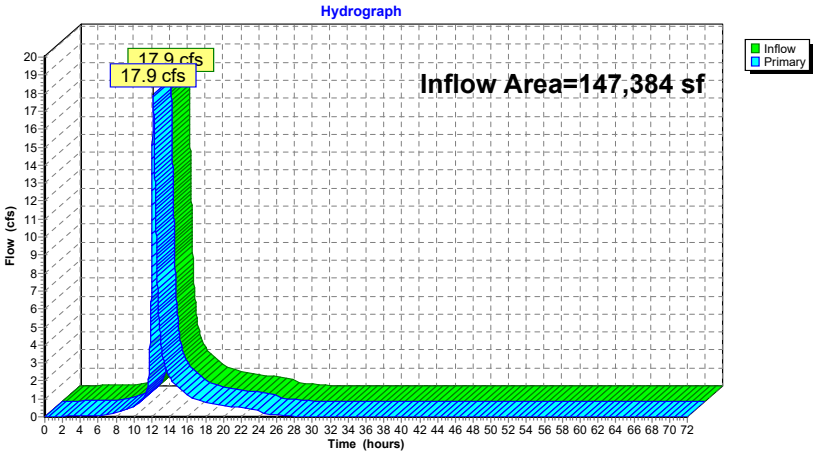


Summary for Link 1L: Towards Wetlands

Inflow Area = 147,384 sf, 49.02% Impervious, Inflow Depth = 7.94" for 100-Year event
Inflow = 17.9 cfs @ 12.15 hrs, Volume= 97,465 cf
Primary = 17.9 cfs @ 12.15 hrs, Volume= 97,465 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: Towards Wetlands

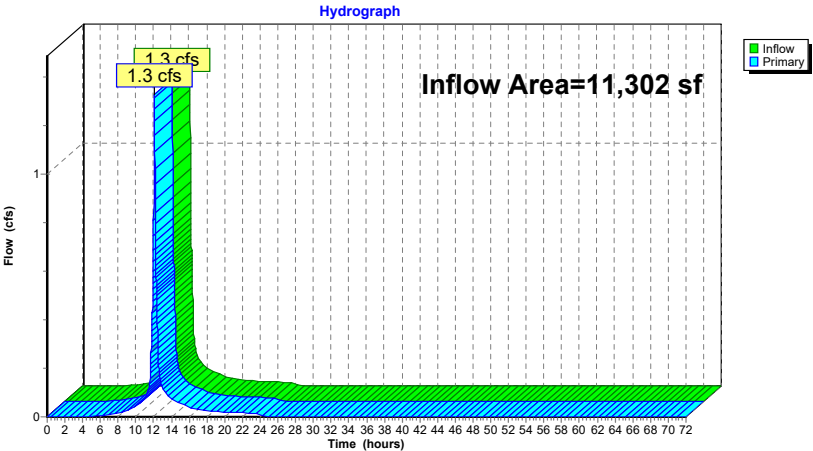


Summary for Link 2L: Towards Street

Inflow Area = 11,302 sf, 56.45% Impervious, Inflow Depth = 4.49" for 100-Year event
Inflow = 1.3 cfs @ 12.09 hrs, Volume= 4,233 cf
Primary = 1.3 cfs @ 12.09 hrs, Volume= 4,233 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 100L : Total Flows

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 2L: Towards Street

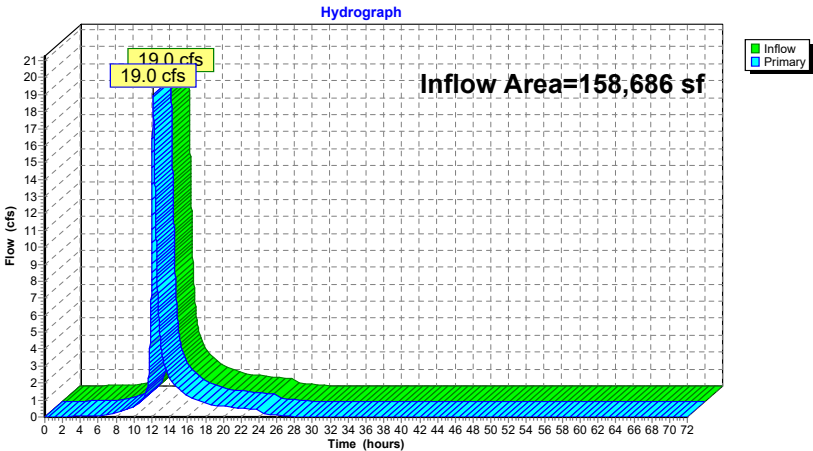


Summary for Link 100L: Total Flows

Inflow Area = 158,686 sf, 49.55% Impervious, Inflow Depth = 7.69" for 100-Year event
Inflow = 19.0 cfs @ 12.14 hrs, Volume= 101,698 cf
Primary = 19.0 cfs @ 12.14 hrs, Volume= 101,698 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 100L: Total Flows



SECTION 6.0

ADDITIONAL DRAINAGE CALCULATIONS

6.01 TSS REMOVAL CALCULATIONS

TSS Removal Calculation Worksheet

Location: Thorndike Place, Arlington, MA

Project: 23407.00



Prepared By: C. Thomas

Date: 8/18/2021

AREA 1 - CB-1

Total Impervious Area, Acres= 0.377

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Deep Sump and Hooded Catchbasins	0.25	1.00	0.25	0.75
Hydrodynamic Separator	0.7	0.75	0.53	0.23
Infiltration Basin	0.8	0.23	0.18	0.05

TSS Removal = 0.96

AREA 2 - TD-1

Total Impervious Area, Acres= 0.069

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Hydrodynamic Separator	0.7	1.00	0.70	0.30
Infiltration Basin	0.8	0.30	0.24	0.06

TSS Removal = 0.94

AREA 3 - TD-2-6

Total Impervious Area, Acres= 0.056

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Infiltration Basin	0.8	1.00	0.80	0.20

TSS Removal = 0.80

AREA 4 - Bypass to Street**Total Impervious Area, Acres= 0.021**

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
		1.00		

TSS Removal =

AREA 5 - East Driveway**Total Impervious Area, Acres= 0.148**

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Rain Garden	0.8	1.00	0.80	0.20

TSS Removal =

0.80

Weighted Annual Average TSS Removal Rate
$$[\text{TSS Removal-1 (Area-1)} + \text{TSS Removal-2 (Area-2)} + \dots] / [\text{Area-1} + \text{Area-2} + \dots] = 0.88$$
Project Site TSS Removal =**0.88**

6.02 GROUNDWATER RECHARGE VOLUME CALCULATIONS

Required Recharge Volume

$$Rv = F \times \text{Impervious Area}$$

Where:

Rv = Recharge Volume

F=Target Depth Factor associated with each Hydrologic Soil Group

(F=0.25-inch for Soil Type C)

Impervious Area = Proposed Pavement and Rooftop area on-site

$$Rv = \left(\frac{0.25 \text{ in}}{12} \right) (78,629 \text{ sft}) =$$

$$Rv = 1,638 \text{ cf (required recharge volume)}$$

As not all impervious surfaces are directed to an infiltration BMP, an adjusted Required Volume must be provided. The adjusted Required Volume (Rva) is calculated as:

$$Rva = \frac{\text{Total Imp.Area}}{\text{Imp.Area to BMP}} (Rv) =$$

$$Rva = \left(\frac{78,629 \text{ sft}}{62,920 \text{ sft}} \right) (1,638 \text{ cf}) =$$

$$Rva = 2,047 \text{ cf}$$

Storage Provided

- Underground Infiltration System = 10,497 cubic feet provided.
Rain garden & duplex infiltration systems not required to meet volume, but provide additional infiltration above and beyond that required.
Refer to the HydroCAD storage table provided for more information.

Stage-Area-Storage for Pond 1P: Underground Infiltration System

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
6.00	8,137	0	8.65	8,137	18,545
6.05	8,137	350	8.70	8,137	18,895
6.10	8,137	700	8.75	8,137	19,245
6.15	8,137	1,050	8.80	8,137	19,595
6.20	8,137	1,400	8.85	8,137	19,945
6.25	8,137	1,750	8.90	8,137	20,295
6.30	8,137	2,099	8.95	8,137	20,644
6.35	8,137	2,449	9.00	8,137	20,994
6.40	8,137	2,799			
6.45	8,137	3,149			
6.50	8,137	3,499			
6.55	8,137	3,849			
6.60	8,137	4,199			
6.65	8,137	4,549			
6.70	8,137	4,899			
6.75	8,137	5,249			
6.80	8,137	5,599			
6.85	8,137	5,948			
6.90	8,137	6,298			
6.95	8,137	6,648			
7.00	8,137	6,998			
7.05	8,137	7,348			
7.10	8,137	7,698			
7.15	8,137	8,048			
7.20	8,137	8,398			
7.25	8,137	8,748			
7.30	8,137	9,098			
7.35	8,137	9,447			
7.40	8,137	9,797			
7.45	8,137	10,147			
7.50	8,137	10,497			
7.55	8,137	10,847			
7.60	8,137	11,197			
7.65	8,137	11,547			
7.70	8,137	11,897			
7.75	8,137	12,247			
7.80	8,137	12,597			
7.85	8,137	12,947			
7.90	8,137	13,296			
7.95	8,137	13,646			
8.00	8,137	13,996			
8.05	8,137	14,346			
8.10	8,137	14,696			
8.15	8,137	15,046			
8.20	8,137	15,396			
8.25	8,137	15,746			
8.30	8,137	16,096			
8.35	8,137	16,446			
8.40	8,137	16,796			
8.45	8,137	17,145			
8.50	8,137	17,495			
8.55	8,137	17,845			
8.60	8,137	18,195			

System outlet at elevation 7.50
10,497 cu. ft. > 2,047 cu. ft.

Drawdown Within 72-Hours

Pond 1P

Rv = Recharge Volume, cu.ft. (see above)

K = Saturated Hydraulic Conductivity, in/hr (from Rawls Table)

Bottom Area = Area of Infiltration System Bottom, sq.ft.

$$Time = \frac{Rv}{(K)(Bottom\ Area)}$$

$$Time = \left(\frac{10,497\ cu.\ ft.}{(0.043\ ft/hr)(8,137\ sq.\ ft.)} \right) =$$

$$Time = 30\ hours$$

- 30 hours < 72 hours

Pond TD2 to TD6

Rv = Recharge Volume, 770 cu.ft. (see HydroCAD)

K = Saturated Hydraulic Conductivity, in/hr (from Rawls Table)

Bottom Area = Area of Infiltration System Bottom, sq.ft.

$$Time = \frac{Rv}{(K)(Bottom\ Area)}$$

$$Time = \left(\frac{770\ cu.\ ft.}{(0.043\ ft/hr)(294\ sq.\ ft.)} \right) =$$

$$Time = 61\ hours$$

- 61 hours < 72 hours

Pond 3P (Rain Garden)

R_v = Recharge Volume, 172 cu.ft. (see HydroCAD)

K = Saturated Hydraulic Conductivity, in/hr (from Rawls Table)

Bottom Area = Area of Infiltration System Bottom, sq.ft.

$$Time = \frac{R_v}{(K)(Bottom\ Area)}$$

$$Time = \left(\frac{172\ cu.\ ft.}{(0.043\ ft/hr)(125\ sq.\ ft.)} \right) =$$

$$Time = 32\ hours$$

- 32 hours < 72 hours

6.03 WATER QUALITY VOLUME CALCULATIONS

Water Quality Volume Calculation

$$V_{WQ} = (D_{WQ}/12 \text{ inches/foot}) * (A_{IMP} \text{ square feet})$$

V_{WQ} = Required Water Quality Volume (in cubic feet)

D_{WQ} = Water Quality Depth: **0.5-inch**

A_{IMP} = Total Impervious Area (in acres) used for driveways, parking, etc.

Underground Infiltration Systems and Bio-Retention Areas

$$A_{IMP} = 78,629 \text{ sq.ft.}$$

$$V_{WQ} = (0.5 \text{ inches}/12 \text{ inches/foot}) * (78,629 \text{ sq.ft.})$$

$V_{WQ} = 3,276$ cubic feet (required volume), provided volume = 10,497 cubic feet in Underground Infiltration System (refer to the HydroCAD storage tables provided in groundwater recharge section). Additional water quality volume provided in duplex infiltration systems and rain garden above and beyond the water quality volume required.

6.04 RIP-RAP OUTLET PROTECTION SIZING

OUTLET PROTECTION SIZING



Project No. 23407.02
 Subject Outlet Protection Sizing Calcs
 Location Arlington, MA

Calc By EAD
 Date 8/15/2023
 Checked by DRR
 Date 8/15/2023

FES-1

Q=Design Discharge, (ft ³ /s)	=	5.1 cfs	
D=Culvert Diameter, (ft)	=	1.25 ft	
TW=Tailwater Depth, (ft)	=	0.5 ft, (0.4xD for unknown tailwater, or enter known tailwater)	
(Tailwater depth is to be limited to between 0.4D and 1.0D)			
Riprap Rock Sizing			
$D_{50} = 0.2D \left[\frac{Q}{\sqrt{gD^{2.5}}} \right]^{4/3} \left[\frac{D}{TW} \right]$ <p style="text-align: right;">g=32.2 fps D₅₀ = median rock size, ft</p>			
D ₅₀ =	0.28	$\left \frac{5.10}{9.91} \right ^{(4/3)} \left \frac{1.25}{0.50} \right = 0.29 \text{ ft}$ = 3.46 inches	
Table 1 : Riprap Classes and Apron Dimensions			
Class	D ₅₀ (in)	Apron Length	
1	5	4D	
2	6	4D	
3	10	5D	
4	14	6D	
5	20	7D	
6	22	8D	
		Apron Depth	
		3.5D ₅₀	
		3.3D ₅₀	
		2.2D ₅₀	
		2.0D ₅₀	
		2.0D ₅₀	
Use Class 1			
Apron Dimensions			
Length, L=5D	=	6 ft	
Depth=3.3D ₅₀	=	16.50 Inches	
Width=3D+(2/3)L	=	7.92 ft (at apron end)	
Riprap Rock Sizing Gradation			
Given Size	Size of Stone, inches		
100	8	to	10
85	7	to	9
50	5	to	8
15	3	to	7

OUTLET PROTECTION SIZING



Project No. 23407.02
 Subject Outlet Protection Sizing Calcs
 Location Arlington, MA

Calc By EAD
 Date 8/15/2023
 Checked by DRR
 Date 8/15/2023

Roof Drain

Q=Design Discharge, (ft ³ /s)	=	3.7 cfs
D=Culvert Diameter, (ft)	=	1.00 ft
TW=Tailwater Depth, (ft)	=	0.4 ft, (0.4xD for unknown tailwater, or enter known tailwater) (Tailwater depth is to be limited to between 0.4D and 1.0D)

Riprap Rock Sizing

$$D_{50} = 0.2D \left[\frac{Q}{\sqrt{gD^{2.5}}} \right]^{4/3} \left[\frac{D}{TW} \right]$$

g=32.2 fps
D₅₀ = median rock size, ft

$$D_{50} = 0.28 \left| \frac{3.70}{5.67} \right|^{(4/3)} \left| \frac{1.00}{0.40} \right| = 0.40 \text{ ft}$$

= 4.75 inches

Table 1 : Riprap Classes and Apron Dimensions

Class	D ₅₀ (in)	Apron Length	Apron Depth
1	5	4D	3.5D ₅₀
2	6	4D	3.5D₅₀
3	10	5D	3.3D ₅₀
4	14	6D	2.2D ₅₀
5	20	7D	2.0D ₅₀
6	22	8D	2.0D ₅₀

Use Class 2

Apron Dimensions

Length, L=5D	=	5 ft
Depth=3.3D ₅₀	=	19.80 Inches
Width=3D+(2/3)L	=	6.33 ft (at apron end)

Riprap Rock Sizing Gradation

Given Size	Size of Stone, inches	
100	9	to 12
85	8	to 11
50	6	to 9
15	3	to 8

6.05 GROUNDWATER MOUNDING ANALYSIS

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	
12.12	0.2	103	6.02	0	0	0	<u>Infiltration System 1P</u>
12.13	0.2	107	6.02	0.1	0.1	0	51555 Impervious Surface (sft)
12.14	0.2	111	6.02	0.1	0.1	0	
12.15	0.1	115	6.02	0.1	0.1	0	0.025 Required recharge volume (acre-ft)
12.16	0.1	118	6.02	0.1	0.1	0	
12.17	0.1	121	6.02	0.1	0.1	0	0.100 Average infiltration rate (cfs)
12.18	0.1	123	6.02	0.1	0.1	0	
							8640.00 Average infiltration rate (cft/day)
12.4	0.1	152	6.02	0.1	0.1	0	
12.41	0.1	152	6.02	0.1	0.1	0	8137 System bottom area (sft)
12.42	0.1	152	6.02	0.1	0.1	0	(use 196'L x 41.3'W)
12.43	0.1	153	6.02	0.1	0.1	0	
12.44	0.1	153	6.02	0.1	0.1	0	1.062 Percolation/application rate (ft/day)
12.45	0.1	153	6.02	0.1	0.1	0	
12.46	0.1	153	6.02	0.1	0.1	0	12.13 Infiltration start time
12.47	0.1	153	6.02	0.1	0.1	0	
12.48	0.1	153	6.02	0.1	0.1	0	13.35 Infiltration end time
12.49	0.1	153	6.02	0.1	0.1	0	
12.5	0.1	153	6.02	0.1	0.1	0	1.22 Time (hrs)
13.26	0	111	6.02	0.1	0.1	0	0.051 Time (days)
13.27	0	111	6.02	0.1	0.1	0	
13.28	0	110	6.02	0.1	0.1	0	1.04 Hydraulic conductivity (ft/day)
13.29	0	110	6.02	0.1	0.1	0	
13.3	0	110	6.02	0.1	0.1	0	0.138 Specific yield
13.31	0	109	6.02	0.1	0.1	0	
13.32	0	109	6.02	0.1	0.1	0	5 Initial saturated thickness (ft)
13.33	0	108	6.02	0.1	0.1	0	
13.34	0	108	6.02	0.1	0.1	0	0.381 Increase in hydraulic head (ft)
13.35	0	107	6.02	0.1	0.1	0	
13.36	0	107	6.02	0	0	0	Note that full tabular hydrograph not printed for brevity

Input Values

1.1430
0.138
1.04
98.420
20.670
0.046
5.000

R
Sy
K
x
y
t
hi(0)

Recharge (infiltration) rate (feet/day)
Specific yield, Sy (dimensionless, between 0 and 1)
Horizontal hydraulic conductivity, Kh (feet/day)*
1/2 length of basin (x direction, in feet)
1/2 width of basin (y direction, in feet)
duration of infiltration period (days)
initial thickness of saturated zone (feet)

inch/hour feet/day
0.67 1.33

2.00 4.00

hours days
36 1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

5.381
0.381

h(max)
Δh(max)

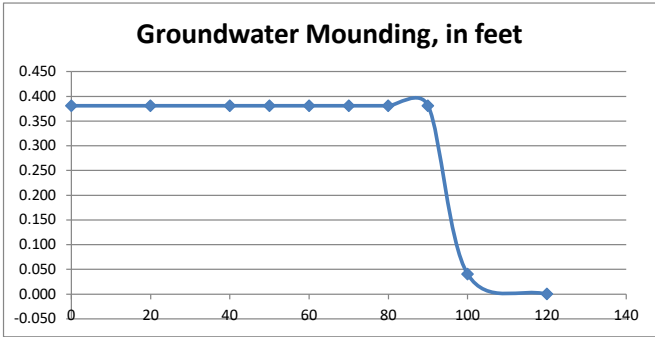
maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet Distance from center of basin in x direction, in feet

0.381	0
0.381	20
0.381	40
0.381	50
0.381	60
0.381	70
0.381	80
0.381	90
0.040	100
0.000	120



Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.8	0.00001	0		5	0.00000	0.00000
5.81	0.00001	0		5	0.00001	0.00001
5.82	0.00001	0		5	0.00001	0.00001
5.83	0.00001	0		5	0.00001	0.00001
5.84	0.00001	0		5	0.00001	0.00001
5.85	0.00001	0		5	0.00001	0.00001
5.86	0.00001	0		5	0.00001	0.00001
15.62	0.00050	1	5.01	0.00060	0.00060	0.00000
15.63	0.00049	1	5.01	0.00060	0.00060	0.00000
15.64	0.00049	1	5.01	0.00059	0.00059	0.00000
15.65	0.00049	1	5.01	0.00059	0.00059	0.00000
15.66	0.00049	1	5.01	0.00059	0.00059	0.00000
15.67	0.00049	1	5.01	0.00059	0.00059	0.00000
15.68	0.00049	1	5.01	0.00058	0.00058	0.00000
15.69	0.00048	1	5.01	0.00058	0.00058	0.00000
15.7	0.00048	1	5.01	0.00058	0.00058	0.00000
15.71	0.00048	1	5.01	0.00058	0.00058	0.00000
15.72	0.00048	1	5.01	0.00058	0.00058	0.00000
25.49	0.00000	0	5	0.00001	0.00001	0.00000
25.5	0.00000	0	5	0.00001	0.00001	0.00000
25.51	0.00000	0	5	0.00001	0.00001	0.00000
25.52	0.00000	0	5	0.00001	0.00001	0.00000
25.53	0.00000	0	5	0.00001	0.00001	0.00000
25.54	0.00000	0	5	0.00001	0.00001	0.00000
25.55	0.00000	0	5	0.00001	0.00001	0.00000
25.56	0.00000	0	5	0.00001	0.00001	0.00000
25.57	0.00000	0	5	0.00001	0.00001	0.00000
25.58	0.00000	0	5	0.00001	0.00001	0.00000
25.59	0.00000	0	5	0.00000	0.00000	0.00000

TD5 representative of duplex systems with least separation to groundwater

Infiltration System TD5

1076 Impervious Surface (sft)

0.001 Required recharge volume (acre-ft)

0.001 Average infiltration rate (cfs)

53.03 Average infiltration rate (cft/day)

294 System bottom area (sft)
(use 21.3'L x 13.8'W)

0.180 Percolation/application rate (ft/day)

5.81 Infiltration start time

25.58 Infiltration end time

19.77 Time (hrs)

0.824 Time (days)

1.04 Hydraulic conductivity (ft/day)

0.138 Specific yield

5 Initial saturated thickness (ft)

0.84 Increase in hydraulic head (ft)

Note that full tabular hydrograph not printed for brevity

Input Values

0.1910
0.138
1.04
10.670
6.900
0.824
5.000

R
Sy
K
x
y
t
hi(0)

Recharge (infiltration) rate (feet/day)
Specific yield, Sy (dimensionless, between 0 and 1)
Horizontal hydraulic conductivity, Kh (feet/day)*
1/2 length of basin (x direction, in feet)
1/2 width of basin (y direction, in feet)
duration of infiltration period (days)
initial thickness of saturated zone (feet)

inch/hour feet/day
0.67 1.33

2.00 4.00
hours days
36 1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

5.840
0.840

h(max)
Δh(max)

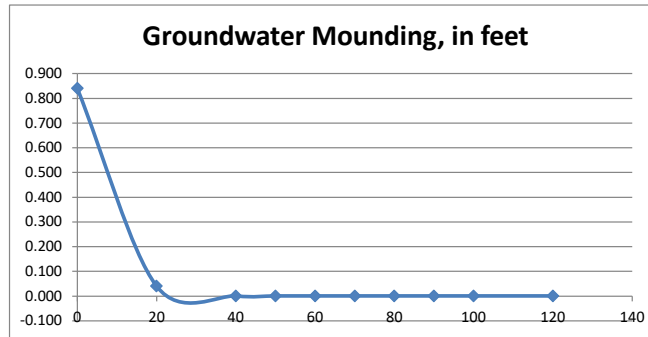
maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet Distance from center of basin in x direction, in feet

0.840	0
0.040	20
0.000	40
0.000	50
0.000	60
0.000	70
0.000	80
0.000	90
0.000	100
0.000	120



Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

6.06 ILLICIT DISCHARGE COMPLIANCE STATEMENT

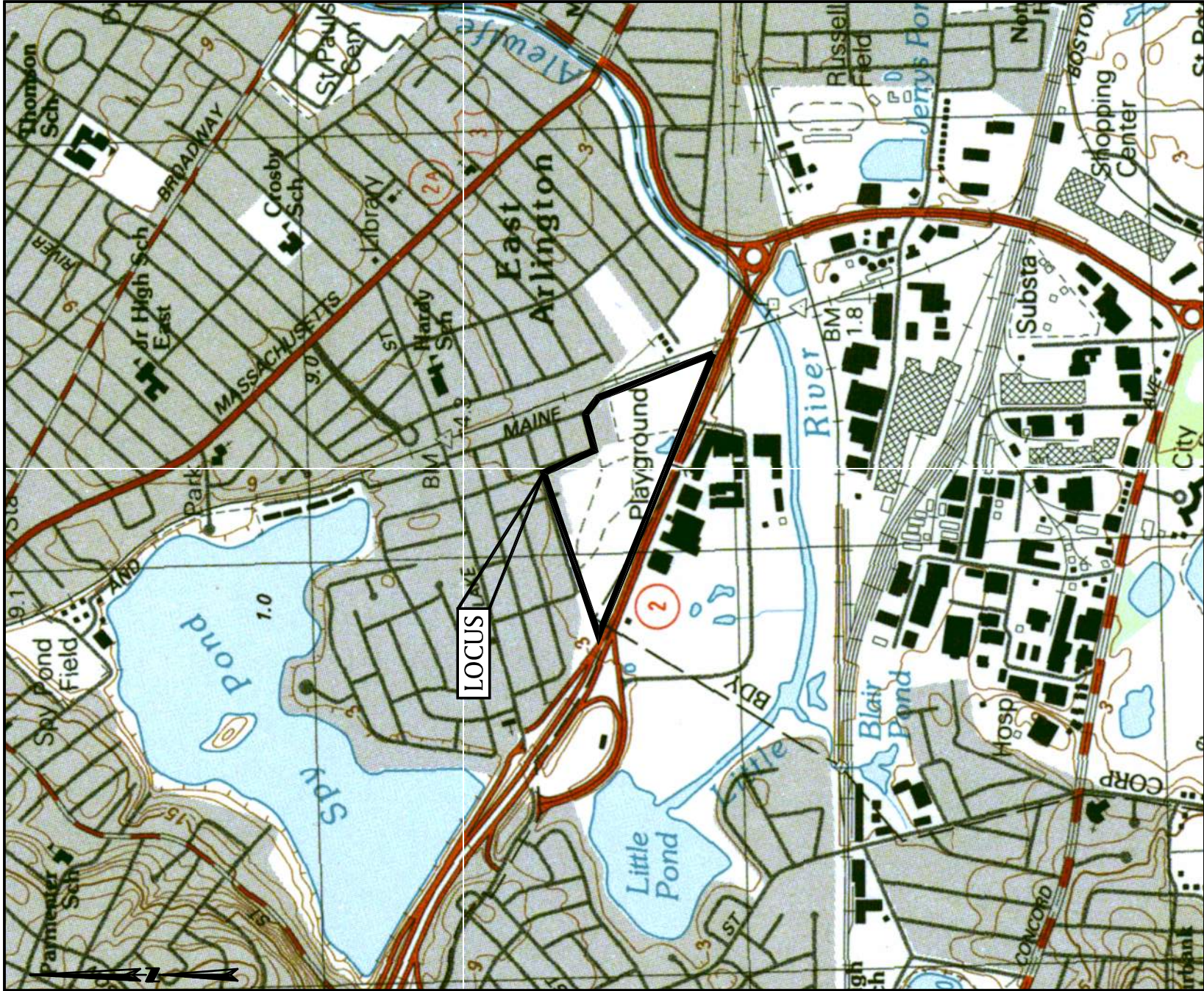
Illicit Discharge Compliance Statement

This statement is to document that, to the best of my knowledge and belief, there are no and will be no illicit discharges to the stormwater management systems or protected wetland resource areas for the Thorndike Place residential development on Dorothy Road in Arlington, Massachusetts.

Authorized Signature/Title

Date

APPENDIX A
USGS LOCUS MAP



APPENDIX B

FEMA MAP

DWLRQD DRRG-EPUGDHU)BWWH



FHOG

ff1



4)6\$7 7\$5(3(4)5\$7\$

6\$32
6\$36

	LWHRW %DHPRGPHDWLRQ % -FCH\$ 9 \$
	LWK%RU\$BWK -FCH\$ 2\$-9 \$
	\$HXODWRLU,DRRGD

26\$2
26\$

	\$DQDQ &DQHPRG-EPUG \$UDV R DQDQ FQDHPHORGZWKDHUDH G\$BWKOHVWQDQRHRRW RU ZWKDULQ DUHD/R OHVWQDQRHVWQDHEOHQH;
	XWXUH&QD.WLRQ/\$DQDQ &DQHPRG-EPUG -FCH;
	\$UDZWK\$G\$GDRRG\$NGHWR HMH GH RVHV -FCH;
	\$UDZWKDRRG\$NGHWRHMH -FCH'

26\$6

	\$UDR DQED DRRG-EPUG -FCH;
	(HFWLYH)
	\$UDR &GWHUEQGDRRG-EPUG -FCH'
	&DQDQ &OYHUW RU &VRURZU
	HMH'LN RU DRRGDO

26
26\$

	\$URV&FWLRQ/ZWKSDQD &DQHP
	DVHU &UDPHOHYDWLRQ
	&DQDQ ZUDQFW
	%DHPRGPHDWLRQLQH %
	LEW R &VXG
	-XULVLFWLRQ%&QDUL
	&DQDQ ZUDQFW %DQDQ
	\$URLOH%DQDQ
	\$URUD\$LF)DVXUH

6\$6

	LJLWDD DWD\$DQDQ
	RJLJWDD DWD\$DQDQ
	\$DSSG



74HS.QQL VSDQHGRQWKH\$LV/DQDSSURLEBWH
SRLQV VHOHFWHGBWKHXU DQDGRV/QRV UH\$UH
DQDQWRLWDLVYHSUR\$UW,ORFDWLRQ

74LVBSF\$DQVZWK\$VWQDQDQV/IRU WKHXHR
QLJWDD IORGB\$V/LJLV/QRV YRLGDV/GHFWLGB\$DQDQ
74HEDH\$V\$DQDQDQVZWK\$VWQDQDQ
DQDQDQWQDQDQV

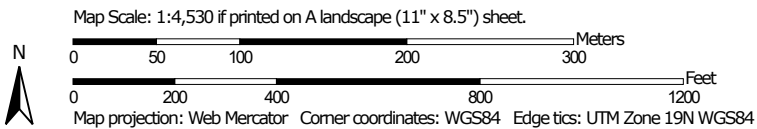
74IORGKQDQGLQRUBWLRQLVGHULYHGGLUHFWO\IURVWK
DQDQWRLWDLVYH\$ZEVHULFHV/SURLGGB\$ 74LVBS
ZVH\$UWVHGRQ DV 3 DQDGRV/QRV
UHOHFW RQDQV/RU DQDQDQV V\$H\$QV/VRLV/LVGDWHQDQ
WLR 74H\$DQDQH\$FWLYHQRUBWLRQDQDQDQ
B\$F\$V\$UWVHGB\$QDQDQDQVWLRU WLR

74LVBSL\$HVLVYRLGLI WKHQHURU RUHR WKH\$RODQDQDQ
H\$DQDQV/QRV DQDQDQ DQDQDQDQ IORGB\$DQDQDQ
OH\$DQ V\$DQDQDQ DQDQDQDQDQDQ DQDQDQDQDQ
)\$DQDQ DQDQ DQDQDQDQDQDQDQ DQDQDQDQDQ
X\$DQDQDQDQDQDQDQDQDQDQDQDQDQDQDQDQ
UH\$DQDQDQDQDQDQDQDQDQDQDQDQDQDQDQDQ

APPENDIX C

WEB SOIL SURVEY









Hydrologic Soil Group—Middlesex County, Massachusetts



MAP LEGEND**Area of Interest (AOI)**
 Area of Interest (AOI)
Soils**Soil Rating Polygons**





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available


Soil Rating Lines






-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

Water Features
 Streams and Canals
Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background
 Aerial Photography
MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 22, Sep 9, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	B/D	4.3	4.4%
52A	Freetown muck, 0 to 1 percent slopes	B/D	11.6	11.9%
603	Urban land, wet substratum		34.0	34.9%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	15.0	15.4%
655	Udorthents, wet substratum		32.4	33.3%
Totals for Area of Interest			97.4	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX D

TEST PIT LOGS



Commonwealth of Massachusetts
City/Town of Arlington

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Arlington Land Realty, LLC

Owner Name

Dorothy Road

Street Address

Arlington

City

MA

State

16-8-2, 16-8-3, 16-8-4, 16-8-5, 16-8-6, 16-8-7A

Map/Lot #

02474

Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey 655, 51A
Source Soil Map Unit
- Udorthents, Swansea Muck Fill throughout site; clay base layer in one test pit
Soil Name Soil Limitations
- Glaciofluvial deposit Depression
Soil Parent material Landform
3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/USGS Glaciomarine fine deposits, stagnant ice deposits
Year Published/Source Map Unit
- fine/very fine sand down to very fine sand, silt, silty clay, and clay
Description of Geologic Map Unit:
4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No
5. Within a velocity zone? ☐ Yes ☒ No
6. Within a Mapped Wetland Area? ☒ Yes ☐ No If yes, MassGIS Wetland Data Layer: Shallow marsh meadow
Wetland Type
7. Current Water Resource Conditions (USGS): 11/25/2020 Range: ☒ Above Normal ☐ Normal ☐ Below Normal
Month/Day/ Year
8. Other references reviewed: Not in Zone I, II, or IWPA (OLIVER)



**Commonwealth of Massachusetts
City/Town of Arlington**

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-1 11/25/2020 7:45 AM Cloudy, 30deg 42.40 N 71.15 W
Hole # Date Time Weather Latitude Longitude

1. Land Use Woodland adjacent to residential/highway Forest Some large boulders
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: _____

2. Soil Parent Material: Glaciofluvial deposits Depression SU
Landform Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands >100 feet
Property Line >100 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 108" Depth Weeping from Pit 108" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0"-10	A	SL	7.5YR 2.5/1	--	--	--	0	0	massive	friable	
10"-36"	B (fill)	gravelly sandy loam	10YR 3/3	--	--	--	10	2-4	massive	very friable	
36"-48"											
48"-108"	C1 (fill)	gravelly sandy loam	10YR 2/1	--	--	--	15-20	4-6	massive	very friable	
36"-78"	C2 (fill)	loamy sand	10YR 5/4	--	--	--	0	0	single grain	loose	sandy layer (only on E side of test pit)
78"-108"	2C2 (fill)	gravelly sandy loam	10YR 2/1	--	--	--	15-20	4-6	massive	very friable	gravelly layer below sandy layer on E side of test pit

Additional Notes:

Elevation of TP-1 = 12.0. Groundwater at bottom of test pit (9' - elevation 3.0). Test pit mostly fill



Commonwealth of Massachusetts
City/Town of Arlington

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-2 11/25/20 8:45AM Cloudy, 35deg 42.40 N 71.15 W
Hole # 20 Time Weather Latitude Longitude:
1. Land Use: Woodland adjacent to residential/highway Forest Some large boulders around 0-2%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: _____

2. Soil Parent Material: Glaciofluvial deposits Depression SU
Landform Position on Landscape (SU, SH, BS, FS, TS)
3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands >100 feet
Property Line >100 feet Drinking Water Well >100 feet Other _____ feet
4. Unsuitable
Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock
5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-7	A	sandy loam	10YR 2.5/1	--	--	--	0	0	massive	friable	
7-132	C (fill)	gravelly sandy loam	10YR 3/2	--	--	--	15-20	4-6	massive	friable	

Additional Notes:

Elevation of TP-2 = 11.2. Estimated groundwater elevation (to bottom of test pit) = 0.2. Fill throughout test pit. No groundwater observed



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☒ Depth observed standing water in observation hole

Obs. Hole # TP-1

108 inches

Obs. Hole # TP-2

_____ inches

☐ Depth weeping from side of observation hole

_____ inches

_____ inches

☐ Depth to soil redoximorphic features (mottles)

_____ inches

_____ inches

☐ Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

_____ inches

Index Well Number _____

Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 108 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☒ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?

Upper boundary: _____

inches

Lower boundary: _____

inches

c. If no, at what depth was impervious material observed?

Upper boundary: _____

108
inches

Lower boundary: _____

>108 (fill material)
inches



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

Emily Derrig SE14158

Typed or Printed Name of Soil Evaluator / License #

11/25/2020

Date

12/1/2020

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with [Percolation Test Form 12](#).

Field Diagrams: Use this area for field diagrams:



Commonwealth of Massachusetts
City/Town of Arlington

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Arlington Land Realty, LLC

Owner Name

Dorothy Road

Street Address

Arlington

City

MA

State

16-8-2, 16-8-3, 16-8-4, 16-8-5, 16-8-6, 16-8-7A

Map/Lot #

02474

Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey 655, 51A
Source Soil Map Unit
- Udorthents, Swansea Muck Fill throughout site; clay base layer in one test pit
Soil Name Soil Limitations
- Glaciofluvial deposit Depression
Soil Parent material Landform
3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/USGS Glaciomarine fine deposits, stagnant ice deposits
Year Published/Source Map Unit
- fine/very fine sand down to very fine sand, silt, silty clay, and clay
Description of Geologic Map Unit:
4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No
5. Within a velocity zone? ☐ Yes ☒ No
6. Within a Mapped Wetland Area? ☒ Yes ☐ No If yes, MassGIS Wetland Data Layer: Shallow marsh meadow
Wetland Type
7. Current Water Resource Conditions (USGS): 11/25/2020 Range: ☒ Above Normal ☐ Normal ☐ Below Normal
Month/Day/ Year
8. Other references reviewed: Not in Zone I, II, or IWPA (OLIVER)



C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Description of Location: _____

2. Soil Parent Material: Glaciofluvial deposits Depression FS
Landform Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands >100 feet
Property Line >100 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 84" Depth Weeping from Pit 144" Depth Standing Water in Hole

[illegible]

TP-3 Elevation = 6.5. Groundwater observed at bottom of test pit (12') and weeping from sides at 7' - estimated groundwater elevation = -0.5



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number:

Hole #

Date

Time

Weather

Latitude

Longitude:

1. Land Use: (e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location:

2. Soil Parent Material: Landform Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Wetlands _____ feet
Property Line _____ feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable

Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☒ Depth observed standing water in observation hole

Obs. Hole # TP-3

Obs. Hole # _____

132 inches

_____ inches

☒ Depth weeping from side of observation hole

84 inches

_____ inches

☐ Depth to soil redoximorphic features (mottles)

_____ inches

_____ inches

☐ Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

_____ inches

Index Well Number _____

Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 84 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☒ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?

Upper boundary: _____

Lower boundary: _____

inches

inches

c. If no, at what depth was impervious material observed?

Upper boundary: _____

Lower boundary: _____

84
inches

132
inches



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

Emily Derrig SE14158

Typed or Printed Name of Soil Evaluator / License #

11/25/2020

Date

12/1/2020

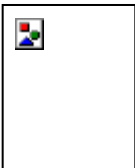
Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with [Percolation Test Form 12](#).

Field Diagrams: Use this area for field diagrams:



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Arlington Land Realty, LLC.

Owner Name

Dorothy Road

Street Address

Arlington

City

MA

State

16-8-2, 16-8-3, 16-8-4, 16-8-5, 16-8-6, 16-8-7A

Map/Lot #

02474

Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade

2. Soil Survey NRCS USDA Web Soil Survey

Source

655

Soil Map Unit

Udorthents, wet substratum

Soil Series

Depressions

Landform

Soil Limitations

Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Soil Parent material

3. Surficial Geological Report

2018/USGS

Year Published/Source

Artificial fill, glaciomarine fine deposits, stagnant ice deposits

Map Unit

Fine/very fine sand down to very fine sand, silt, silty clay, and clay

Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No

If yes, MassGIS Wetland Data Layer:

Wetland Type

7. Current Water Resource Conditions (USGS):

Month/Day/ Year

Range: ☐ Above Normal

☐ Normal

☐ Below Normal

8. Other references reviewed:

(Zone II, IWPA, Zone A, EEA Data Portal, etc.)

Not in Zone II or IWPA (MassMapper)



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-1 5/18/23 9:00AM Clear 42.4' N 71.2' W
Hole # Date Time Weather Latitude Longitude

1. Land Use Wooded lot in residential area Trees Some surface stones, not many 3%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: At the front of the site along Dorothy Road, about 32' in from the edge of the road

2. Soil Parent Material: Glaciofluvial deposits Depression SU
Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands 280 feet
Property Line 22 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 108" Depth to Weeping in Hole 114" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-90	Fill	Sandy Loam	7.5YR 3/2		Cnc : Dpl:		0	4-6	Massive	Friable	
90-120	C	Fine Sandy Loam	7.5YR 5/2		Cnc : Dpl:		0	0	Massive	Friable	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: Top of monitoring well 3'-8" from ground surface



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-2 5/18/23 1:30PM Clear 42.4' N 71.2' W
Hole # Date Time Weather Latitude Longitude

1. Land Use Wooded lot in residential area Trees Some surface stones, not many 2%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: At the front of the site along Dorothy Road, about 30' in from the edge of the road

2. Soil Parent Material: Glaciofluvial deposits Depression BS
Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands 270 feet
Property Line 22 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: _____ Depth to Weeping in Hole 97" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-83	Fill	Sandy Loam	10YR 3/2		Cnc : Dpl:		0	4-6	Massive	Friable	
83-104	C	Fine Sandy Loam	10YR 5/1		Cnc : Dpl:		0	0	Massive	Friable	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Shifted back a few feet because of boulder or buried piece of debris

Seemed like there may have been a second layer of sandy material below the point where groundwater broke into the hole



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

☐ Depth to soil redoximorphic features

☒ Depth to observed standing water in observation hole

☐ Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

Obs. Hole # TP-1

_____ inches

108 inches

_____ inches

Obs. Hole # TP-2

_____ inches

97 inches

_____ inches

Index Well Number _____

Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☒ No

b. If yes, at what depth was it observed (exclude O, A, and E Horizons)?

Upper boundary: _____

_____ inches

Lower boundary: _____

_____ inches

c. If no, at what depth was impervious material observed?

Upper boundary: _____

97
_____ inches

Lower boundary: _____

104
_____ inches



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3 5/18/23 2:30PM Clear 42.4' N 71.2' W
Hole # Date Time Weather Latitude Longitude

1. Land Use Wooded lot in residential area Trees Some surface stones, not many 6%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: At the front of the site along Dorothy Road, about 32' in from the edge of the road

2. Soil Parent Material: Glaciofluvial deposits Depression BS
Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands 280 feet
Property Line 22 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: _____ Depth to Weeping in Hole 82" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-27	Fill	Sandy Loam	10YR 2/2		Cnc : Dpl:		0	4-6	Massive	Friable	Buried A layer at 21"
27-87	C	Fine Sandy Loam	10YR 4/3	51"	Cnc : 7.5YR5/8 Dpl:		0	0	Massive	Friable	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-4 5/19/23 8:15AM Clear 42.4' N 71.2' W
Hole # Date Time Weather Latitude Longitude

1. Land Use Wooded lot in residential area Trees Some surface stones, not many 6%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: At the front of the site along Dorothy Road, about 30' in from the edge of the road

2. Soil Parent Material: Glaciofluvial deposits Depression TS
Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands 310 feet
Property Line 24 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 68" Depth to Weeping in Hole 72" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-64	Fill	Gravelly Sandy Loam	7.5YR 3/1		Cnc : Dpl:		10-15	2-4	Massive	Friable	
64-96	C	Fine Loamy Sand	10YR 4/2		Cnc : Dpl:		2-4	0	Massive	Very Friable	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

☒ Depth to soil redoximorphic features

Obs. Hole # TP-3

51 inches

Obs. Hole # TP-4

_____ inches

☒ Depth to observed standing water in observation hole

82 inches

68 inches

☐ Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

_____ inches

Index Well Number _____

Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☒ No

b. If yes, at what depth was it observed (exclude O, A, and E Horizons)?

Upper boundary: _____

inches

Lower boundary: _____

inches

c. If no, at what depth was impervious material observed?

Upper boundary: _____

68

inches

Lower boundary: _____

96

inches



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-5 5/19/23 10:30AM Clear 42.4' N 71.2' W
Hole # Date Time Weather Latitude Longitude

1. Land Use Wooded lot in residential area Trees Some surface stones, not many 10%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: At the front of the site along Dorothy Road, about 35' in from the edge of the road

2. Soil Parent Material: Glaciofluvial deposits Depression BS
Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands 230 feet
Property Line 24 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 60" Depth to Weeping in Hole 60" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-33	Fill	Gravelly Sandy Loam	10YR 3/2		Cnc : Dpl:		10	4-6	Massive	Friable	Buried A layer at 26"
33-74	C	Fine Sandy Loam	10YR 5/2	48"	Cnc : Dpl:		0	0	Massive	Friable	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-6 5/19/23 9:00AM Clear 42.4' N 71.2' W
Hole # Date Time Weather Latitude Longitude

1. Land Use Wooded lot in residential area Trees Some surface stones, not many 5%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: At the front of the site along Dorothy Road, about 120' in from the edge of the road

2. Soil Parent Material: Glaciofluvial deposits Depression TS
Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands 110 feet
Property Line 12 feet Drinking Water Well >100 feet Other feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 110" Depth to Weeping in Hole 110" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-30	Fill	Gravelly Sandy Loam	7.5YR 3/2		Cnc : Dpl:		10-15	4-6	Massive	Friable	
30-132	C	Fine Sandy Loam	10YR 5/2	39"	Cnc : 7.5YR5/8 Dpl:		0	0	Massive	Friable	
				64"	Cnc : 7.5YR5/8 Dpl:						Second redox band - calling ESGW here
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Multiple redox bands in C horizon
Top of monitoring well 1'-8" from ground surface



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

☒ Depth to soil redoximorphic features

Obs. Hole # TP-5

48 inches

Obs. Hole # TP-6

64 inches

☒ Depth to observed standing water in observation hole

60 inches

110 inches

☐ Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

_____ inches

Index Well Number _____

Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☒ No

b. If yes, at what depth was it observed (exclude O, A, and E Horizons)?

Upper boundary: _____

inches

Lower boundary: _____

inches

c. If no, at what depth was impervious material observed?

Upper boundary: _____

60

inches

Lower boundary: _____

74

inches



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7 5/18/23 11:00AM Clear 42.4' N 71.2' W
Hole # Date Time Weather Latitude Longitude

1. Land Use Wooded lot in residential area Trees Some surface stones, not many 3%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: At the front of the site along Dorothy Road, about 110' in from the edge of the road

2. Soil Parent Material: Glaciofluvial deposits Depression BS
Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands 190 feet
Property Line 100 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: _____ Depth to Weeping in Hole 110" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-108	Fill	Gravelly Sandy Loam	7.5YR 3/1		Cnc : Dpl:		10	4-6	Massive	Friable	
108-114	C	Fine Sandy Loam	5Y 5/1		Cnc : Dpl:		0	0	Massive	Friable	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: Sand layer was completely saturated
Top of monitoring well 4'-6" from ground surface



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-8 5/18/23 10:00AM Clear 42.4' N 71.2' W
Hole # Date Time Weather Latitude Longitude

1. Land Use Wooded lot in residential area Trees Some surface stones, not many 4%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: At the front of the site along Dorothy Road, about 110' in from the edge of the road

2. Soil Parent Material: Glaciofluvial deposits Depression TS
Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands 210 feet
Property Line 98 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 112" Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-120	Fill	Gravelly Sandy Loam	7.5YR 3/1		Cnc : Dpl:		10	4-6	Massive	Friable	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

☐ Depth to soil redoximorphic features

Obs. Hole # TP-7

_____ inches

Obs. Hole # TP-8

_____ inches

☒ Depth to observed standing water in observation hole

110 inches

112 inches

☐ Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

_____ inches

Index Well Number _____

Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☒ No

b. If yes, at what depth was it observed (exclude O, A, and E Horizons)?

Upper boundary: _____

inches

Lower boundary: _____

inches

c. If no, at what depth was impervious material observed?

Upper boundary: _____

120
inches

Lower boundary: _____

120
inches



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of mv soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

Emily Derrig, SE 14158

Typed or Printed Name of Soil Evaluator / License #

5/22/2023

Date

6/30/2023

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with [Percolation Test Form 12](#).

Field Diagrams: Use this area for field diagrams:

APPENDIX E

NOAA 14++ PRECIPITATION TABLES



NOAA Atlas 14, Volume 10, Version 3
Location name: Arlington, Massachusetts, USA*
Latitude: 42.4008°, Longitude: -71.1485°
Elevation: 5 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.303 (0.237-0.383)	0.372 (0.290-0.471)	0.484 (0.377-0.617)	0.578 (0.447-0.739)	0.706 (0.530-0.954)	0.802 (0.590-1.11)	0.905 (0.649-1.31)	1.03 (0.691-1.52)	1.21 (0.784-1.86)	1.36 (0.864-2.14)
10-min	0.429 (0.335-0.543)	0.527 (0.411-0.668)	0.687 (0.535-0.874)	0.819 (0.633-1.05)	1.00 (0.751-1.35)	1.14 (0.837-1.58)	1.28 (0.919-1.86)	1.46 (0.979-2.15)	1.71 (1.11-2.63)	1.93 (1.22-3.03)
15-min	0.505 (0.395-0.639)	0.620 (0.484-0.785)	0.808 (0.628-1.03)	0.963 (0.745-1.23)	1.18 (0.884-1.59)	1.34 (0.983-1.85)	1.51 (1.08-2.18)	1.71 (1.15-2.52)	2.02 (1.31-3.09)	2.28 (1.44-3.56)
30-min	0.690 (0.540-0.874)	0.849 (0.663-1.08)	1.11 (0.862-1.41)	1.32 (1.02-1.70)	1.62 (1.22-2.19)	1.84 (1.36-2.55)	2.08 (1.49-3.02)	2.36 (1.59-3.48)	2.80 (1.81-4.29)	3.17 (2.01-4.96)
60-min	0.876 (0.685-1.11)	1.08 (0.842-1.37)	1.41 (1.10-1.79)	1.68 (1.30-2.16)	2.06 (1.55-2.79)	2.34 (1.73-3.25)	2.64 (1.90-3.85)	3.01 (2.03-4.44)	3.58 (2.32-5.49)	4.06 (2.57-6.37)
2-hr	1.14 (0.896-1.43)	1.40 (1.10-1.77)	1.84 (1.44-2.32)	2.20 (1.71-2.79)	2.69 (2.04-3.62)	3.06 (2.27-4.22)	3.46 (2.51-5.01)	3.96 (2.67-5.79)	4.74 (3.08-7.21)	5.43 (3.45-8.42)
3-hr	1.33 (1.05-1.66)	1.63 (1.29-2.05)	2.14 (1.68-2.69)	2.56 (2.00-3.24)	3.13 (2.38-4.20)	3.55 (2.65-4.90)	4.02 (2.93-5.81)	4.61 (3.12-6.70)	5.54 (3.60-8.36)	6.35 (4.04-9.79)
6-hr	1.72 (1.37-2.14)	2.11 (1.68-2.63)	2.76 (2.18-3.44)	3.29 (2.59-4.14)	4.02 (3.07-5.34)	4.56 (3.42-6.22)	5.15 (3.77-7.37)	5.90 (4.01-8.50)	7.06 (4.61-10.6)	8.08 (5.16-12.3)
12-hr	2.20 (1.76-2.71)	2.69 (2.15-3.33)	3.50 (2.79-4.34)	4.17 (3.31-5.21)	5.10 (3.92-6.71)	5.78 (4.35-7.80)	6.52 (4.79-9.21)	7.44 (5.08-10.6)	8.85 (5.80-13.1)	10.1 (6.45-15.2)
24-hr	2.64 (2.13-3.24)	3.27 (2.64-4.02)	4.31 (3.46-5.31)	5.16 (4.12-6.40)	6.34 (4.91-8.30)	7.21 (5.47-9.67)	8.16 (6.03-11.5)	9.35 (6.41-13.2)	11.2 (7.36-16.4)	12.8 (8.22-19.1)
2-day	3.01 (2.45-3.67)	3.80 (3.09-4.64)	5.10 (4.13-6.24)	6.18 (4.97-7.61)	7.66 (5.97-9.97)	8.74 (6.69-11.7)	9.94 (7.43-13.9)	11.5 (7.91-16.1)	14.0 (9.23-20.3)	16.2 (10.4-23.9)
3-day	3.30 (2.70-4.01)	4.16 (3.39-5.05)	5.56 (4.52-6.78)	6.72 (5.43-8.24)	8.32 (6.52-10.8)	9.48 (7.29-12.6)	10.8 (8.09-15.1)	12.5 (8.60-17.4)	15.2 (10.1-21.9)	17.7 (11.4-25.9)
4-day	3.58 (2.93-4.33)	4.46 (3.65-5.41)	5.91 (4.82-7.18)	7.11 (5.76-8.69)	8.76 (6.88-11.3)	9.96 (7.68-13.2)	11.3 (8.51-15.7)	13.1 (9.02-18.1)	15.9 (10.5-22.8)	18.4 (11.9-26.9)
7-day	4.34 (3.58-5.23)	5.26 (4.33-6.34)	6.77 (5.55-8.18)	8.02 (6.53-9.74)	9.74 (7.68-12.5)	11.0 (8.50-14.4)	12.4 (9.33-17.0)	14.2 (9.85-19.5)	17.1 (11.4-24.3)	19.7 (12.7-28.5)
10-day	5.04 (4.17-6.05)	5.99 (4.95-7.19)	7.54 (6.20-9.07)	8.82 (7.21-10.7)	10.6 (8.37-13.5)	11.9 (9.20-15.5)	13.3 (10.0-18.1)	15.1 (10.5-20.7)	18.0 (12.0-25.4)	20.5 (13.3-29.5)
20-day	7.05 (5.88-8.40)	8.08 (6.73-9.63)	9.76 (8.09-11.7)	11.2 (9.19-13.4)	13.1 (10.4-16.4)	14.5 (11.2-18.6)	16.0 (12.0-21.2)	17.8 (12.5-24.0)	20.3 (13.6-28.4)	22.4 (14.6-32.0)
30-day	8.72 (7.30-10.3)	9.81 (8.20-11.6)	11.6 (9.65-13.8)	13.1 (10.8-15.6)	15.1 (12.0-18.7)	16.7 (12.9-21.1)	18.3 (13.6-23.8)	19.9 (14.0-26.8)	22.2 (14.9-30.9)	24.0 (15.7-34.0)
45-day	10.8 (9.08-12.7)	12.0 (10.0-14.1)	13.9 (11.6-16.4)	15.4 (12.8-18.4)	17.6 (14.0-21.6)	19.3 (14.9-24.1)	20.9 (15.5-26.9)	22.6 (15.9-30.1)	24.6 (16.6-33.9)	26.2 (17.1-36.8)
60-day	12.6 (10.6-14.8)	13.8 (11.6-16.2)	15.8 (13.2-18.6)	17.4 (14.5-20.7)	19.7 (15.7-24.0)	21.4 (16.6-26.7)	23.1 (17.1-29.5)	24.7 (17.5-32.8)	26.7 (18.0-36.6)	28.0 (18.3-39.2)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

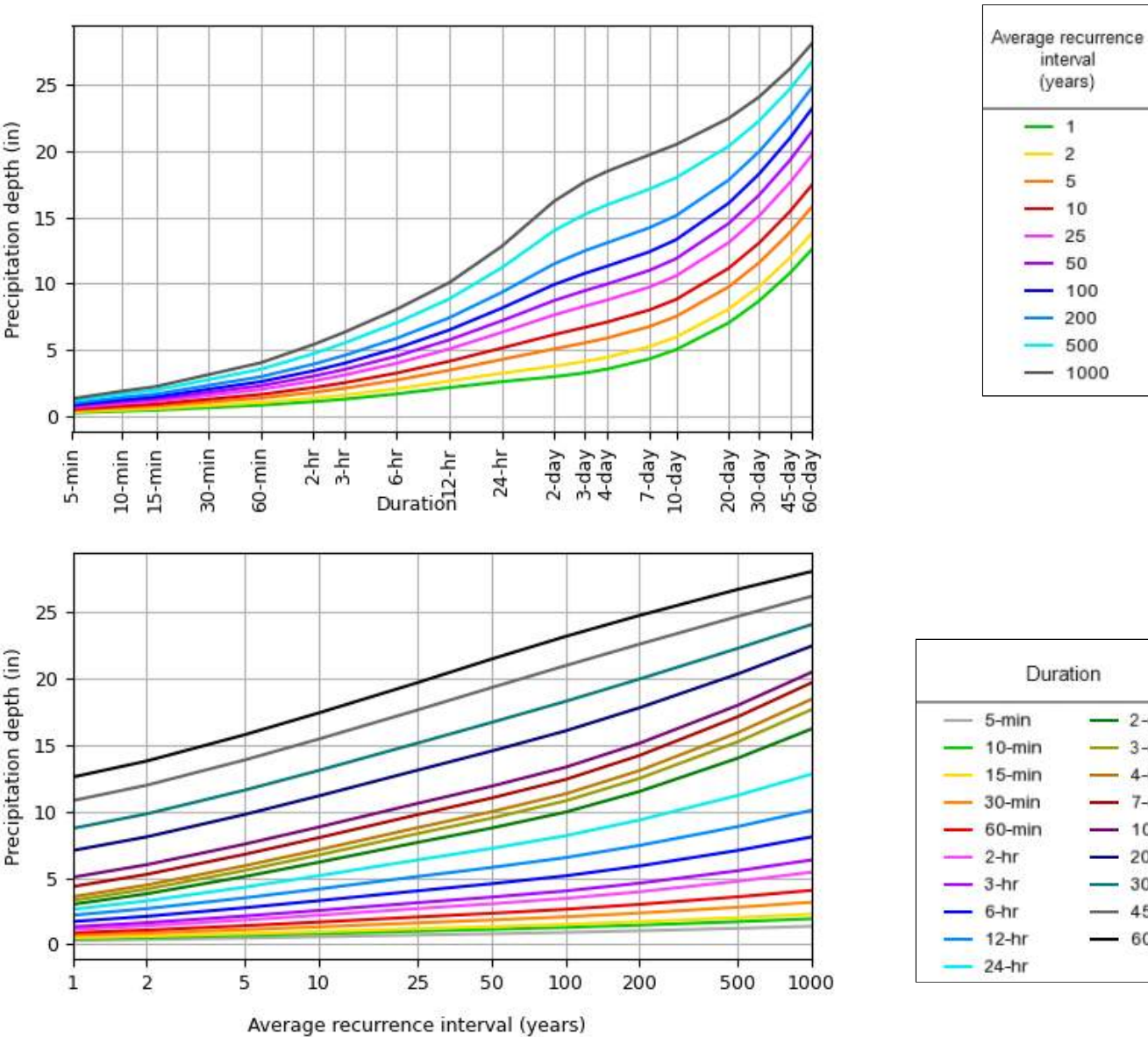
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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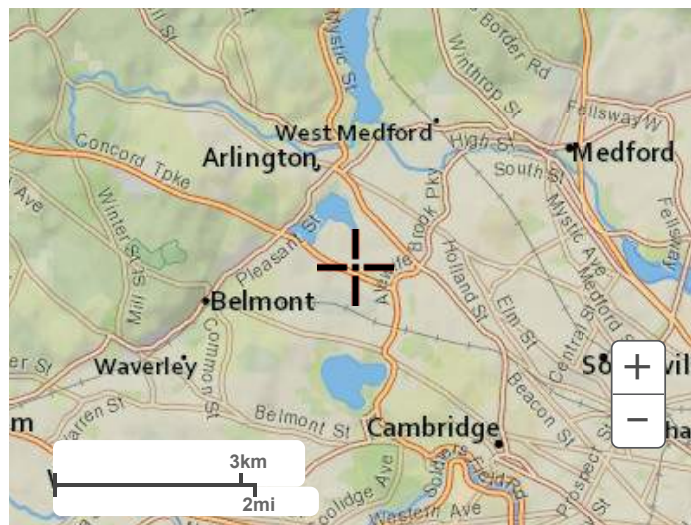
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 42.4008°, Longitude: -71.1485°



Maps & aerals

Small scale terrain



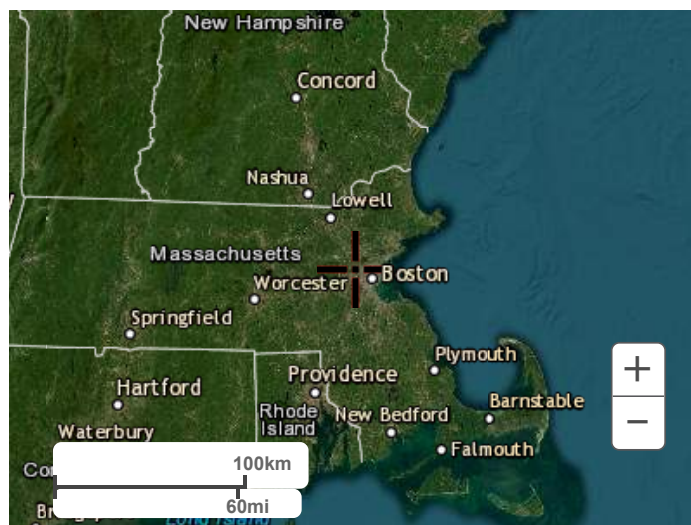
Large scale terrain



Large scale map



Large scale aerial

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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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APPENDIX F

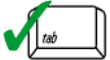
STORMWATER CHECKLIST



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☒ New development
- ☐ Redevelopment
- ☐ Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☒ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
 - ☐ Credit 1
 - ☐ Credit 2
 - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☒ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☒ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☒ Static
 - ☐ Simple Dynamic
 - ☐ Dynamic Field¹
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - ☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - ☐ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
 - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - ☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
 - ☒ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☒ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☐ Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- ☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
 - ☐ Redevelopment Project
 - ☐ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☒ Name of the stormwater management system owners;
 - ☒ Party responsible for operation and maintenance;
 - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☒ Description and delineation of public safety features;
 - ☐ Estimated operation and maintenance budget; and
 - ☒ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- ☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☐ An Illicit Discharge Compliance Statement is attached;
- ☒ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

SEPTEMBER 6, 2023

www.bscgroup.com

Arlington Conservation Commission
730 Mass Ave. Annex
Arlington, MA 02476

**RE: Notice of Intent (NOI)
Thorndike Place Residential Community
Dorothy Rd, Arlington, MA**

Dear Conservation Commission Members,

On behalf of Arlington Land Realty, LLC, BSC Group, Inc. is filing the enclosed Notice of Intent (NOI) under the Massachusetts Wetland Protection Act (WPA) for the construction of the Thorndike Place Residential Community. Matters pertaining to the Arlington Wetlands Bylaw are subsumed within the Comprehensive Permit granted by the Arlington Zoning Board of Appeals (ZBA), dated November 22, 2021. Within the public hearing process on the Comprehensive Permit application, the Commission actively participated, and recommended certain proposed conditions, which became part of the Comprehensive Permit.

As the Commission may recall, the Thorndike Place development is a proposed rental and ownership residential community on a 17.7-acre parcel of land, located between Route 2/Concord Turnpike to the south, residential neighborhoods to the north and west, and Thorndike Park to the east. The project is a multi-family housing development consisting of twelve (12) for sale family homes, contained within six (6) duplex buildings together with 124-unit residential apartments for adults over 62 years of age located within a single residential building. The development will include structured and outside parking, landscaping, lighting, and other improvements. Approximately twelve (12) acres of the 17.7-acre site are proposed to be preserved in perpetuity as open space, under a Conservation Restriction.

The proposed Project includes work within the FEMA 100-Year Floodplain / Bordering Land Subject to Flooding (BLSF), as well as within the Buffer Zone to Bordering Vegetated Wetlands (BVW). No work is proposed within the BVW resource area. Impacts include 32,616-sf / 4,392.9-cu ft of fill within BLSF, for which 9,160.8-cu ft of compensatory flood storage will be provided, and 34,084-sf of impacts to the 100-ft Buffer Zone to BVW (associated with built area and areas of porous pavement). A Stormwater Management Report has been prepared and included, which documents compliance with state stormwater management requirements.

We are submitting six (6) copies of the NOI and the Town's portion of the filing fee. Copies and the State's portion of the filing fee are also being sent to DEP. We ask that you schedule this matter for discussion at your next available meeting, currently scheduled for September 21, 2023. If you have any questions or require

additional information, please do not hesitate to contact me at (617) 896-4386, or by email at drinaldi@bscgroup.com.

Sincerely,



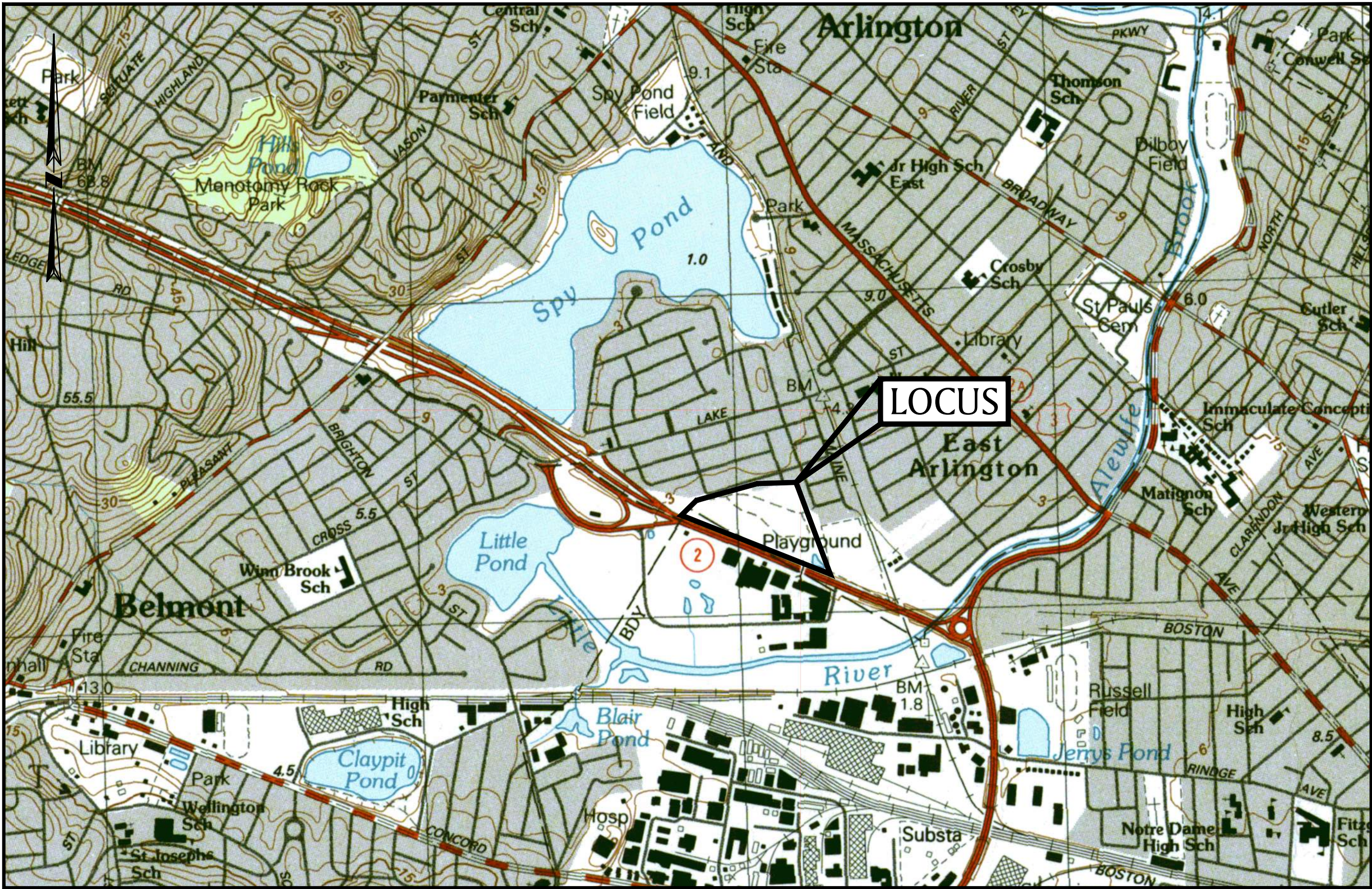
Dominic Rinaldi, PE,
BSC Group, Inc.

Cc: Gwendolen Noyes - Arlington Land Realty, LLC
Art Klipfel - Arlington Land Realty, LLC
Scott Oran - Arlington Land Realty, LLC
Mark Dufton - Arlington Land Realty, LLC
Stephanie Kiefer - Smolak & Vaughan LLP
Matt Burne - BSC Group
Emily Derrig - BSC Group

THORNDIKE PLACE
NOTICE OF INTENT
DOROTHY ROAD
ARLINGTON, MASSACHUSETTS
SEPTEMBER 6, 2023

INDEX OF DRAWINGS

- G-100 TITLE SHEET
- G-101 GENERAL NOTES & LEGEND
- V-100 EXISTING CONDITIONS
- C-100 EXISTING ENVIRONMENTAL
RESOURCE PLAN
- C-101 SITE PREPARATION PLAN
- C-102 OVERALL SITE PLAN
- C-103 LAYOUT & MATERIALS PLAN
- C-104 GRADING & DRAINAGE PLAN
- C-105 UTILITY PLAN
- L-100 PLANTING PLAN
- C-200-203 CIVIL & LANDSCAPE DETAILS



LOCUS MAP

500 0 1000 2000 3000 feet
SCALE: 1" = 1000±

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PREPARED BY:

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

1. EXISTING CONDITIONS SURVEY INFORMATION WAS PREPARED BY BSC GROUP, INC. SURVEY IS BASED ON AN ON-THE-GROUND SURVEY CONDUCTED BY BSC GROUP IN DECEMBER 2019-FEBRUARY 2020.
2. REVIEW ALL EXISTING CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES BETWEEN PLANS AND ACTUAL CONDITIONS TO THE OWNER'S REPRESENTATIVE IN WRITING PRIOR TO STARTING WORK.
3. THE LOCATIONS OF UNDERGROUND UTILITIES SHOWN ON THIS PLAN ARE BASED ON THE SURVEY REFERENCED ABOVE. THE CONTRACTOR SHALL CONTACT DIGSAFE (888-344-7233 OR 811) AND THE PROPER LOCAL AUTHORITIES OR RESPECTIVE UTILITY COMPANIES TO CONFIRM THE LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. ANY DAMAGE DUE TO FAILURE OF THE CONTRACTOR TO CONTACT THE PROPER AUTHORITIES SHALL BE BORNE BY THE CONTRACTOR.
4. ANY DISCREPANCIES BETWEEN DRAWINGS, SPECIFICATIONS, AND SITE CONDITIONS SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER IN WRITING FOR CLARIFICATION AND RESOLUTION PRIOR TO BIDDING OR CONSTRUCTION.

1. ONLY AREAS DESIGNATED FOR CLEARING SHALL BE CLEARED.
2. THE SUBCONTRACTOR(S) IS/ARE RESPONSIBLE FOR ANY DAMAGE TO EXISTING CONDITIONS TO REMAIN THAT ARE DUE TO SUBCONTRACTOR(S) OPERATIONS.
3. ITEMS TO BE REMOVED THAT ARE NOT STOCKPILED FOR LATER REUSE ON THE PROJECT OR DELIVERED TO THE OWNER SHALL BE LEGALLY DISPOSED OF OFF SITE BY THE SUBCONTRACTOR(S).
4. THE SUBCONTRACTOR(S) SHALL BE RESPONSIBLE FOR COORDINATING THEIR EFFORTS WITH ALL TRADES.
5. THE CONTRACTOR SHALL COORDINATE ALL ADJUSTMENT OR ABANDONMENT OF UTILITIES WITH THE RESPECTIVE UTILITY COMPANY.
6. THE SUBCONTRACTOR(S) SHALL MAINTAIN OR ADJUST TO NEW FINISH GRADE AS NECESSARY ALL UTILITY AND SITE STRUCTURES SUCH AS LIGHT POLES, SIGN POLES, MAN HOLES, CATCH BASINS, HAND HOLES, WATER AND GAS GATES, HYDRANTS, ETC., FROM MAINTAINED UTILITY AND SITE SYSTEMS UNLESS OTHERWISE NOTED OR DIRECTED BY THE CONTRACTOR/ENGINEER.
7. TEMPORARY CONSTRUCTION HAUL ROADS (IF REQUIRED) SHALL BE EXCAVATED AND THE SUB-BASE COMPACTED TO 95% SPMD. THE USE OF SEPARATION FABRIC MAY BE USED TO FACILITATE FUTURE REMOVAL AND RECOVERY OF GRANULAR MATERIALS. HAUL ROAD SHALL HAVE AT LEAST 9" OF 6-INCH MINUS STONE AND SHALL BE MAINTAINED DURING CONSTRUCTION.

1. EROSION CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH THE SEQUENCE OF STAGED CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A DETAILED EROSION CONTROL PLAN INCLUDING SCHEDULE FOR APPROVAL BY THE TOWN OF ARLINGTON. A COPY OF THE APPROVED NPDES – EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE.
2. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY SITE EXCAVATION OR DISTURBANCE AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROCESS. THE SMALLEST PRACTICAL AREA OF LAND SHALL BE EXPOSED AT ANY ONE TIME.
3. SEDIMENT TRAPS SHALL BE INSTALLED AT DRAINAGE STRUCTURES IN PUBLIC STREET IN THE PROJECT AREA. STRAW BALE BARRIERS AND SILTATION FENCES ARE TO BE MAINTAINED AND CLEANED UNTIL ALL SLOPES HAVE BEEN STABILIZED.
4. SEDIMENT BARRIERS SHALL BE INSPECTED AND APPROVED BY THE TOWN OF ARLINGTON BEFORE CONSTRUCTION CAN START.
5. STRAW BALES AND MULCH SHALL BE MOWINGS OF ACCEPTABLE HERBACEOUS GROWTH, FREE OF NOXIOUS WEEDS OR WOODY STEMS, AND SHALL BE DRY WHEN INSTALLED.
6. THE UNDERSIDE OF STRAW BALES SHOULD BE KEPT IN CLOSE CONTACT (TRENCHED IN 3-INCHES MINIMUM) WITH THE EARTH AND RESET AS NECESSARY.
7. DISTURBED AREAS SHALL BE BLANKETED OR SEEDED AND MULCHED AS SOON AS PRACTICAL AFTER CONSTRUCTION ACTIVITIES IN THAT AREA HAVE CONCLUDED. ALL ERODABLE/BARE AREAS SHALL BE BLANKETED OR SEEDED AND MULCHED WITHIN 7 DAYS WITH TEMPORARY EROSION CONTROL SEEDING.
8. STABILIZE SLOPES GREATER THAN 3:1 (HORIZONTAL:VERTICAL) WITH SEED, SECURED GEOTEXTILE FABRIC, SPRAYED COMPOST BLANKET, OR RIP-RAP AS REQUIRED TO PREVENT EROSION DURING CONSTRUCTION.
9. SEDIMENT BARRIERS SHALL BE CONSTRUCTED AROUND ALL SOIL STOCKPILE AREAS.
10. CLEAN OUT DRAINAGE FEATURES AND STRUCTURES AFTER COMPLETION OF CONSTRUCTION.
11. SEDIMENT COLLECTED DURING CONSTRUCTION BY THE VARIOUS TEMPORARY EROSION CONTROL SYSTEMS SHALL BE DISPOSED OF OFF SITE ON A REGULAR BASIS. SEDIMENT SHALL BE REMOVED FROM EROSION CONTROL SYSTEMS WHEN THE HEIGHT OF THE SEDIMENT EXCEEDS ONE-HALF OF THE HEIGHT OF THE SEDIMENT CONTROL MEASURE.
12. AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE SUBCONTRACTOR(S) SHALL REMOVE ALL TEMPORARY EROSION CONTROL MEASURES AT THE CONTRACTOR/ENGINEER DIRECTION.
13. AFTER THE REMOVAL OF TEMPORARY EROSION CONTROL MEASURES, THE SUBCONTRACTOR(S) SHALL GRADE AND SEED AREA OF TEMPORARY EROSION CONTROL MEASURE.
14. DAMAGED OR DETERIORATED ITEMS WILL BE REPAIRED IMMEDIATELY AFTER IDENTIFICATION OR AS DIRECTED BY THE CONTRACTOR/ENGINEER.
15. THE CONTRACTOR'S SITE SUPERINTENDENT WILL BE RESPONSIBLE FOR DAILY INSPECTIONS, MAINTENANCE, AND REPAIR ACTIVITIES. THE CONTRACTOR SHALL INSPECT EROSION CONTROL MEASURES EVERY SEVEN (7) CALENDAR DAYS. DAMAGED AND INEFFECTIVE EROSION CONTROL MEASURES SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS.
16. PIPE OUTLETS (IF ANY) SHALL BE STABILIZED WITH STONE.
17. TEMPORARY SEEDING SHALL BE AT A RATE OF 45 LBS PER ACRE. ERODABLE AREAS OUTSIDE AND DOWN SLOPE FROM THE CONSTRUCTION LIMITS SHALL BE SIMILARLY SEEDED.
18. WATER PUMPED OR OTHERWISE DISCHARGED FROM THE SITE DURING CONSTRUCTION DEWATERING SHALL BE FILTERED. DEWATERING PLAN SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.
19. WHEN TEMPORARY DRAINAGE IS ESTABLISHED, EROSION/SEDIMENTATION CONTROL MEASURES MAY BE REQUIRED BY CONTRACTOR/ENGINEER.
20. GRAVEL CONSTRUCTION ROADS AND CONSTRUCTION PARKING AREAS OF SUFFICIENT WIDTH AND LENGTH, AND VEHICLE WASH DOWN FACILITIES, SHALL BE PROVIDED TO PREVENT SOIL FROM BEING TRACKED OUTSIDE TO PUBLIC OR PRIVATE ROADWAYS. ANY SOIL REACHING A PUBLIC OR PRIVATE ROADWAY SHALL BE REMOVED BEFORE THE END OF EACH WORKDAY AND AS NEEDED.
21. NECESSARY MEASURES SHALL BE TAKEN TO CONTAIN ANY FUEL OR POLLUTION RUNOFF. LEAKING EQUIPMENT OR SUPPLIES SHALL BE IMMEDIATELY REPAIRED OR REMOVED FROM THE SITE.
22. THE COST OF REPAIRING OR REMOVING SEDIMENT FROM EROSION CONTROL SYSTEMS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR THE APPLICABLE EROSION CONTROL ITEM.
23. ALL EROSION CONTROL MEASURES SHALL BE KEPT OPERATIONAL AND MAINTAINED CONTINUOUSLY THROUGHOUT THE PERIOD OF LAND DISTURBANCE UNTIL PERMANENT SEDIMENT AND EROSION CONTROL MEASURES ARE OPERATIONAL. CONTRACTOR SHALL PROVIDE TO THE CONSERVATION COMMISSION MEASURES (EROSION AND SEDIMENTATION CONTROL) FOR WORK DURING WINTER CONDITIONS.
24. CONTRACTOR SHALL SPRAY WATER FROM A WATER TRUCK ON DRY AND WINDY DAYS TO PREVENT DUST FROM FORMING.
25. EROSION CONTROL MEASURES AS SHOWN ON THESE DRAWINGS ARE INTENDED TO CONVEY MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES AS NECESSARY TO PREVENT SOIL EROSION AND TO COMPLY WITH THE PROJECT'S STORMWATER POLLUTION PREVENTION PLAN.
26. SOILS ON SLOPES THAT ARE 3:1 OR STEEPER SHOULD BE ROUGHENED PER THE EPA'S NPDES SOIL ROUGHENING FACT SHEET IF THEY ARE TO BE SEEDED WITHIN 2 WEEKS OF DISTURBANCE. IF NOT, EROSION CONTROL BLANKETS SHOULD BE INSTALLED ON THESE SLOPES.

1. THE FOLLOWING LAYOUT CRITERIA SHALL CONTROL UNLESS OTHERWISE NOTED ON THE PLAN:
 - a. ALL TIES TO PROPERTY LINES ARE PERPENDICULAR TO THE PROPERTY LINE UNLESS OTHERWISE NOTED.
 - b. DISTANCES AND DIMENSIONS ARE IN DECIMAL FEET.
2. SCREENED IMAGES SHOW EXISTING CONDITIONS. WHERE EXISTING CONDITIONS LIE UNDER OR ARE IMPINGED UPON BY PROPOSED BUILDINGS AND/OR SITE ELEMENTS, THE EXISTING CONDITION SHALL BE REMOVED, ABANDONED AND/OR CAPPED OR DEMOLISHED AS REQUIRED. AMBIGUITIES IN THE PLANS SHALL BE CLARIFIED BY THE ENGINEER OR SITE SUPERINTENDENT UPON WRITTEN REQUEST FOR CLARIFICATION BY THE SUBCONTRACTOR.

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE APPLICANT. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ALL UNDERGROUND UTILITIES.
2. THE PROJECT APPLICANT SHALL OBTAIN ALL NECESSARY STREET-OPENING PERMITS, WATER AND SEWER CONNECTION PERMITS AND PAY REQUIRED FEES PRIOR TO COMMENCING WORK ON THESE UTILITIES.
3. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY COORDINATION WITH THE TOWN OF ARLINGTON.
4. ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF ALL GAS, ELECTRIC, TELEPHONE, AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES SHALL BE MADE BY THE PROJECT APPLICANT.
5. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.
6. WHERE PROPOSED GRADES MEET EXISTING GRADES, SUBCONTRACTOR(S) SHALL BLEND GRADES TO PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING AND NEW WORK. PONDING AT TRANSITION AREAS WILL NOT BE ALLOWED.
7. POSITIVE DRAINAGE SHALL BE MAINTAINED AWAY FROM ALL STRUCTURES.
8. SUBCONTRACTOR(S) SHALL VERIFY EXISTING GRADES AND NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES.
9. PRIOR TO ANY WORK OVER EXISTING TOWN-OWNED UTILITIES, CONTRACTOR TO EVALUATE CONDITION OF SUBSURFACE UTILITIES PRIOR TO CONSTRUCTION. A POST-CONSTRUCTION EVALUATION SHALL ALSO BE PERFORMED TO IDENTIFY ANY DAMAGE CAUSED DURING CONSTRUCTION.
10. ANY INSTALLATION OF UTILITY POLES OR UNDERGROUND CONDUIT WITHIN THE PUBLIC RIGHT-OF-WAY WILL REQUIRE A GRANT OF LOCATION FROM THE BOARD OF SELECTMEN.

1. MAINTENANCE SHALL BEGIN IMMEDIATELY AFTER PLANTING AND SHALL CONTINUE UNTIL FINAL WRITTEN ACCEPTANCE OF PLANT MATERIAL.
2. MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL BUILDING FOUNDATIONS AND STRUCTURES.
3. MAXIMUM SLOPE WITHIN DISTURBED AREAS SHALL NOT EXCEED 3:1, UNLESS OTHERWISE NOTED.
4. THE LANDSCAPE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN QUANTITIES SUFFICIENT TO COMPLETE PLANTINGS SHOWN ON THE DRAWINGS.
5. MATERIALS SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE AMERICAN NURSERY AND LANDSCAPE ASSOCIATION.
6. PLANTS SHALL BEAR THE SAME RELATIONSHIP TO FINISH GRADE AS TO ORIGINAL GRASSES BEFORE DIGGING.
7. PLANTS SHALL BE BALLED IN BURLAP OR CONTAINERIZED.
8. AREAS PLANTED WITH EVERGREEN TREES SHALL BE COVERED WITH A MINIMUM 3" OF MULCH. MULCH FOR PLANTED AREAS TO BE AGED PINE BARK: PARTIALLY DECOMPOSED, DARK BROWN IN COLOR AND FREE OF WOOD CHIPS THICKER THAN 1/4 INCH.
9. THE LANDSCAPE CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIALS FOR ONE (1) FULL YEAR FROM DATE OF ACCEPTANCE.
10. PLANT MATERIALS ARE SUBJECT TO THE APPROVAL OF THE LANDSCAPE ARCHITECT, AT THE NURSERY, AND AT THE SITE.
11. PLANT SPECIES AS INDICATED IN THE PLANT LIST ARE SUGGESTIONS ONLY. FINAL SELECTION OF SPECIES SHALL OCCUR AT THE TIME OF PLANT PURCHASE, DEPENDING ON AVAILABILITY. PLANT SIZE AND QUANTITY SHALL NOT CHANGE WITHOUT APPROVAL OF LANDSCAPE ARCHITECT.

CONTRACTOR REQUIRED TO ABIDE BY THE "DECISION ON APPLICATION FOR COMPREHENSIVE PERMIT", ISSUED ON NOVEMBER 22, 2021 WITH SPECIFIC ATTENTION BROUGHT TO THE FOLLOWING CONDITIONS.

D.15 BURNING OR BURIAL OF CONSTRUCTION OR DEMOLITION DEBRIS ON THE SITE IS STRICTLY PROHIBITED. ALL SUCH MATERIALS ARE TO BE REMOVED FROM THE SITE IN ACCORDANCE WITH APPLICABLE LAW. DURING CONSTRUCTION, THE SITE SHALL BE SECURED AGAINST UNAUTHORIZED ENTRY OR VANDALISM BY FENCING, OR OTHER APPROPRIATE MEANS, AND ALL CONSTRUCTION MATERIALS SHALL BE STORED OR STOCKPILED ON THE SITE IN A SAFE MANNER. ANY FLOODLIGHTS USED DURING THE CONSTRUCTION PERIOD SHALL BE LOCATED AND DIRECTED SO AS TO PREVENT SPILLOVER OR ILLUMINATION onto ADJACENT PROPERTIES. ALL CONSTRUCTION ACTIVITIES ARE TO BE CONDUCTED IN A WORKMANLIKE MANNER.

D.16 NO BUILDING AREAS SHALL BE LEFT IN AN OPEN, UNSTABILIZED CONDITION LONGER THAN SIXTY (60) DAYS. TEMPORARY STABILIZATION SHALL BE ACCOMPANIED BY HAY BALES, HAY COVERINGS OR MATTING. FINAL STABILIZATION SHALL BE ACCOMPLISHED BY LOAMING AND SEEDING EXPOSED AREAS.

D.17 ALL DUMPSTERS SERVING THE PROJECT SHALL BE ENCLOSED AND COVERED (WITH THE EXCEPTION OF CONSTRUCTION DUMPSTERS USED DURING CONSTRUCTION). THE BOARD SHALL REVIEW THE DUMPER LOCATION AS PART OF THE APPROVAL OF THE FINAL PLANS IF DIFFERENT FROM WHAT HAS BEEN SHOWN ON THE APPROVED PLANS.

H.2 ALL WATER AND SEWER INFRASTRUCTURE SHALL BE INSTALLED IN CONFORMANCE WITH THE ARLINGTON WATER AND SEWER DIVISION'S TECHNICAL REQUIREMENTS. THE APPLICANT SHALL PROVIDE THE ARLINGTON WATER AND SEWER DIVISION WITH CALCULATIONS TO ENSURE THE DISTRIBUTION SYSTEM FOR THE AREA HAS THE NECESSARY CAPACITY TO MEET SYSTEM DEMAND REQUIRED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

I.1 PRIOR TO COMMENCEMENT OF SITE CLEARING, PREPARATION, AND CONSTRUCTION, EROSION CONTROL MEASURE SHALL BE INSTALLED CONSISTENT WITH THE APPROVED PLANS.

I.3 NO UNCOVERED STOCKPILING OF EARTHEN AND/OR CONSTRUCTION-RELATED MATERIALS SHALL BE PERMITTED WITHIN THE ONE HUNDRED FOOT (100') WETLAND BUFFER ZONE (ALSO REFERENCED LOCALLY AS ADJACENT UPLAND RESOURCES AREA ("AURA")) OR OTHER RESOURCE AREAS.

I.4 NO HEAVY EQUIPMENT MAY BE STORED OVERNIGHT WITHIN THE FIFTY FEET (50') OF BORDERING OR ISOLATED VEGETATED WETLAND RESOURCE AREAS, AND NO REFUELING OR MAINTENANCE OF MACHINERY OR VEHICLES SHALL BE ALLOWED WITHIN THE ONE HUNDRED FOOT (100') BUFFER ZONE, AURA, OR WITHIN ANY BORDERING OR ISOLATED VEGETATED WETLAND RESOURCE AREA OR BORDERING LAND SUBJECT TO FLOODING (BLSF).

I.5 THERE SHALL BE NO DUMPING OF WOODY VEGETATION, LEAVES, GRASS CLIPPINGS, BRUSH, OR OTHER DEBRIS INTO A WETLAND RESOURCE AREA OR ASSOCIATED BUFFER ZONES. DUMPING OF SNOW INTO A WETLAND RESOURCE AREA IS ALSO PROHIBITED AND SHALL COMPLY WITH THE CURRENT MASS DEP BUREAU OF WATER RESOURCES SNOW REMOVAL GUIDANCE. THE FOREGOING DOES NOT APPLY TO THE CLEAN SNOW REMOVED FROM THE EMERGENCY ACCESS ROAD AS LONG AS NO SAND OR NON-APPROVED DE-ICING MATERIALS ARE USED, AND THE SNOW IS CLEAR OF ALL FOREIGN DEBRIS. AN ALTERNATIVE DE-ICING PRODUCT SUCH AS MAGNESIUM CHLORIDE (MgCl) MAY BE USED AS RECOMMENDED IN THE WINTER PARKING LOT AND SIDEWALK MAINTENANCE MANUAL PUBLISHED BY THE MINNESOTA POLLUTION CONTROL AGENCY, [HTTP://WWW.PCA.STATE.MN.US/SITES/DEFAULT/FILES/P-TRL-10/PDF](http://www.pca.state.mn.us/sites/default/files/p-trl-10/PDF).

THE APPLICANT SHALL HIRE A QUALIFIED ENVIRONMENTAL MONITOR WHO WILL REPORT TO THE BOARD AND WILL BE ON-SITE AS PROJECT CONSTRUCTION ADVANCES. THE ENVIRONMENTAL MONITOR SHALL SUBMIT AN ELECTRONIC REPORT TO THE BOARD WEEKLY DURING SITE PREPARATION WORK WITHIN THE ONE HUNDRED FOOT (100') BUFFER ZONE TO VEGETATED WETLANDS, INCLUDING AN UPDATE ON THE FUNCTIONALITY AND CONDITION OF THE EROSION CONTROL MEASURES, UNTIL SUCH TIME THAT THE SITE IS STABILIZED. THE APPLICANT SHALL PROVIDE THE BOARD WITH THE NAME(S), ADDRESS(ES) AND TELEPHONE NUMBER(S) OF THE ENVIRONMENTAL MONITOR PRIOR TO THE START OF WORK.

1.7. WHILE ACTIVE CONSTRUCTION WORK IS UNDERWAY WITHIN THE ONE HUNDRED FOOT (100') BUFFER ZONE, AND DURING THE CREATION OF THE FLOODPLAIN COMPENSATION AREA INCLUDING REMOVAL OF VEGETATION INCLUDING INVASIVE SPECIES, FINAL GRADE ESTABLISHMENT, CREATION OF SOIL PROFILE TO SUPPORT PROPOSED PLANT SPECIES, AND RESTORATION OF A DIVERSIFIED PLANT COMMUNITY, THE ENVIRONMENTAL MONITOR SHALL PROVIDE MONTHLY STATUS REPORTS TO THE BOARD TO CONFIRM THAT ALL ACTIVITIES ARE SUBSTANTIALLY IN COMPLIANCE WITH THE COMPREHENSIVE PERMIT AND ORDER OF CONDITIONS ISSUED BY THE ARLINGTON CONSERVATION COMMISSION. THE ZBA MAY REDUCE THE FREQUENCY OF INSPECTIONS OR REPORTS AS DEEMED APPROPRIATE. THE QUALIFIED ENVIRONMENTAL MONITOR SHALL ALSO SUBMIT AN ELECTRONIC REPORT WITHIN SEVEN DAYS AFTER EVERY RAIN EVENT EXCEEDING 0.5 INCHES OF RAIN IN A 24-HOUR PERIOD TO THE BOARD REGARDING THE CONDITION OF THE PROPERTY DURING AND AFTER THE RAIN EVENT. SUCH REPORT SHALL ALSO INCLUDE THE STATUS OF EROSION CONTROL MEASURES AND ANY ADDITIONAL MEASURES TO ADDRESS STORMWATER MANAGEMENT CAUSED BY SAID RAIN EVENT. THE QUALIFIED ENVIRONMENTAL MONITOR WILL ALSO REVIEW THE APPLICANT'S SWPPP INSPECTION REPORT, AS APPROPRIATE AND NECESSARY.

1.8. ALL WORK SHALL BE CONDUCTED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN. WITHIN ONE WEEK OF FINAL GRADING, WEATHER PERMITTING, ALL DISTURBED AREAS LOCATED WITHIN THE WETLAND RESOURCE AREAS AND BUFFER ZONES SHALL BE STABILIZED AGAINST EROSION. THIS SHALL BE DONE EITHER BY SODDING OR BY LOAMING, SEEDING AND MULCHING ACCORDING TO SOIL CONSERVATION SERVICE STANDARDS AND THE APPROVED PLANS. STABILIZATION WILL BE COMPLETED WHEN THE SURFACE SHOWS COMPLETE VEGETATIVE COVER. TEMPORARY STABILIZATION MEASURES APPROVED BY THE BOARD'S INSPECTIONAL ENGINEER WILL BE REQUIRED SHOULD WORK BE INTERRUPTED FOR MORE THAN TEN (10) DAYS.

1.9. THE APPLICANT, SUCCESSOR OR ASSIGNS SHALL ENSURE THE CLEANLINESS OF ALL CATCH BASINS AND ROADWAY AFFECTED BY THE PROJECT RELATED ACTIVITY. ALL CATCH BASINS WILL BE PROTECTED BY A "SILT BAG INLET PROTECTION" DEVICE OR EQUAL DURING THE PROJECT WORK PERIOD. THE APPLICANT SHALL INSPECT AND CLEAN AS NECESSARY, ALL CATCH BASINS AND SWEEP THE ROADWAY AT LEAST WEEKLY DURING CONSTRUCTION. IT MAY BE REQUIRED MORE FREQUENTLY DURING AND AFTER RAIN EVENTS. IF IT IS DEEMED NECESSARY TO REMOVE THE SILT BAG INLET PROTECTION TO PREVENT LOCALIZED FLOODING AND PUBLIC SAFETY CONCERNS, THE APPLICANT SHALL NOTIFY THE BOARD AND ARLINGTON DPW AND ALSO THE QUALIFIED ENVIRONMENTAL MONITOR.

1.11. THE BOARD OR ITS DULY APPOINTED AGENT (WHICH MAY BE THE TOWN CONSERVATION AGENT ACTING ON BEHALF OF THE BOARD) SHALL HAVE THE RIGHT TO ENTER THE PROPERTY FOR INSPECTIONS AND EVALUATE COMPLIANCE WITH THE WETLANDS CONDITIONS CONTAINED HEREIN UPON REASONABLE NOTICE OF NOT LESS THAN TWENTY-FOUR (24) HOURS. ACCESS SHALL BE ALLOWED WITHOUT THE NEED FOR ADVANCED NOTICE IN EMERGENCY SITUATIONS WHEN NECESSARY TO PREVENT IMMINENT HARM TO WETLANDS RESOURCE AREAS.

1.14. PRIOR TO ANY WORK COMMENCING ON-SITE, THE APPLICANT SHALL SUBMIT TO THE BOARD PROOF THAT A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) CONSTRUCTION GENERAL PERMIT IS ACTIVE FOR THE PROJECT.

1.15. COPIES OF ALL INFORMATION AND ALL REQUIRED REPORTS REGARDING A US EPA NPDES PERMIT AND STORMWATER POLLUTION PREVENTION PLAN (SWPPP) SHALL BE FORWARDED TO THE BOARD VIA ELECTRONIC COPY.

1.19. THE APPLICANT SHALL RETAIN A QUALIFIED PROFESSIONAL ENGINEER TO OVERSEE THE INSTALLATION IF THE STORMWATER SYSTEM. A STORMWATER MITIGATION REPORT SHALL BE SUBMITTED TO THE BOARD WITHIN TEN (10) DAYS OF THE COMPLETION OF THE INSTALLATION OF THE STORMWATER MANAGEMENT SYSTEM. SUCH STORMWATER MITIGATION REPORT SHALL INCLUDE AS-BUILT PLANS, PHOTOGRAPHS FROM INSTALLATION, AND A WRITTEN SUMMARY OF THE INSTALLATION OF THE STORMWATER MANAGEMENT SYSTEMS, AS WELL AS STORMWATER BEST MANAGEMENT PRACTICES (POROUS PAVEMENT, RAIN GARDENS, AND SIMILAR ELEMENTS THROUGHOUT THE PROPERTY).

1.20. THE APPLICANT SHALL TREAT PLANTED AREAS WITHIN RESOURCE AREAS AND BUFFER ZONES ONLY WITH SLOW RELEASE NITROGEN FERTILIZER ONCE DURING THE INITIAL PLANTING YEAR. APPLICATION OF THIS FERTILIZER IS NOT PERMITTED WITHIN TWO DAYS BEFORE AND AFTER STORM EVENTS. LAWN FERTILIZER MAY ONLY BE APPLIED TWICE PER YEAR, ONCE IN THE SPRING AND ONCE IN THE FALL, WITH THE EXCEPTION OF THE INITIAL PLANTING YEAR. THIS SHALL BE A CONTINUING CONDITION IN PERPETUITY THAT SURVIVES THE EXPIRATION OF THIS PERMIT.

1.21. THE APPLICATION OF PLANT NUTRIENTS SHALL COMPLY WITH 330 CMR 31.00. NO OTHER HERBICIDES OR TREATMENT METHODS MAY BE UTILIZED ON THE PROPERTY UNLESS APPROVED AS PART OF THE APPROVED INVASIVE SPECIES MANAGEMENT PLAN. NO PESTICIDES OR RODENTICIDES SHALL BE USED TO TREAT PEST MANAGEMENT ISSUES WITHIN RESOURCE AREAS. THIS SHALL BE A CONTINUING CONDITION IN PERPETUITY THAT SURVIVES THE EXPIRATION OF THIS PERMIT.

1.22. EXCEPT AS SPECIFICALLY NOTED IN CONDITION 1.5, THE APPLICATION OF SAND AND/OR SALT WITHIN THE ONE HUNDRED FEET (100') OF RESOURCE AREA IS PROHIBITED.

1.23. THE APPLICANT SHALL CONDUCT A THOROUGH CATCH BASIN SUMP CLEANING AT ALL PROTECTED CATCH BASINS AT THE END OF CONSTRUCTION OF THE PROJECT.

1.25. ALL PLANT SPECIES PLANTED AND INVASIVE SPECIES REMOVED THROUGH THE PROJECT SHALL BE MONITORED FOR THREE YEARS. A SURVIVAL RATE OF EIGHTY PERCENT (80%) MUST BE MAINTAINED FOR THE APPROVED PLANTING AT THE END OF THE THIRD YEAR OF MONITORING. IF THE SURVIVAL RATE IS LESS THAN EIGHTY PERCENT (80%) AFTER THE END OF THE THIRD YEAR, THE APPLICANT MUST SUBMIT PROPOSED RECOMMENDATIONS FOR REPLACEMENT TO THE BOARD FOR ITS REVIEW AND ADMINISTRATIVE APPROVAL. A MONITORING REPORT SHALL BE SUBMITTED ANNUALLY IN JUNE FOR EACH OF THE YEARS IN THE THREE-YEAR MONITORING PERIOD, REPORTING ON THE HEALTH OF THE NEW PLANTINGS AND THE SUCCESS OF THE INVASIVE PLANT MANAGEMENT. THE APPLICANT SHALL SUBMIT THE CONTACT INFORMATION OF THE PARTY RESPONSIBLE FOR MONITORING AND MAINTAINING THE PLANTED VEGETATION TO THE ZBA. SHOULD ANY CHANGES BE MADE TO THIS PARTY, THE ZBA SHALL BE NOTIFIED. THIS SHALL BE A CONTINUING CONDITION IN PERPETUITY THAT SURVIVES THE EXPIRATION OF THIS PERMIT.

1.26. NO WORK SHALL BE ALLOWED IN OR WITHIN TWENTY-FIVE FEET (25') OF ANY RESOURCE AREA EXCEPT AS SHOWN ON THE APPROVED PLANS.

1.27. NO DISTURBANCES SHALL BE ALLOWED IN OR WITHIN FIFTY FEET (50') OF ANY RESOURCE AREA, EXCEPT AS SHOWN ON THE APPROVED PLANS.

1.30. ANY BUILDING OR SITE DETERAWERING OPERATIONS SHALL CONFORM TO THE FOLLOWING:

1. THE APPLICANT SHALL NOTIFY THE CONSERVATION COMMISSION AND DPW THAT DETERAWERING IS REQUIRED PRIOR TO ANY COMMENCEMENT OF ANY DETERAWERING OPERATIONS.
2. ANY CATCH BASINS, DRAINS, AND OUTFALLS TO BE USED IN DETERAWERING OPERATIONS SHALL BE CLEANED OUT BEFORE OPERATIONS BEGIN.
3. ANY WATER DISCHARGING AS PART OF ANY DETERAWERING OPERATION SHALL BE PASSED THROUGH FILTERS, ON-SITE SETTLING BASINS, SETTLING TANK TRUCKS, OR OTHER DEVICES TO ENSURE THAT NO OBSERVABLE SEDIMENTS OR POLLUTANTS ARE CARRIED INTO ANY RESOURCE AREA, STREET, DRAIN, OR ADJACENT PROPERTY. FILTERING IS ESSENTIAL TO REMOVE ANY AUTOMOTIVE POLLUTANTS FROM THE WATER PRIOR TO DISCHARGE.
4. MEASURES SHALL BE TAKEN TO ENSURE NO EROSION OR SCOURING SHALL OCCUR ON PUBLIC OR PRIVATE PROPERTY, OR ON THE BANKS OR BOTTOMS OF WATER BODIES, AS A RESULT OF DETERAWERING OPERATIONS. DISCHARGES ARE TO BE SET BACK AT LEAST FIFTY FEET (50') FROM BWV AND I/W.
5. DETERAWERING SHALL NOT TAKE PLACE IN ANY MANNER THAT LEADS TO WATER BEING DISCHARGED OR ALLOWED TO FLOW INTO PROPERTY NOT UNDER THE CONTROL OF THE APPLICANT WITHOUT THE EXPRESS WRITTEN CONSENT OF THAT PROPERTY OWNER.

BC	BOTTOM OF CURB
BIT CONC	BITUMINIOUS CONCRETE
BWV	BORDERING VEGETATED WETLANDS
CB	CATCH BASIN
CB/DH	CONC. BOUND/DRILL HOLE
CLF	CHAIN LINK FENCE
DIP	DUCTILE IRON PIPE
DMH	DRAIN MANHOLE
ECB	EROSION CONTROL BARRIER
FES	FLARED END SECTION
FH	FIRE HYDRANT
FOC	FACE OF CURB
FD	FOUND
GG	GAS GATE
HW	HEADWALL
ILSF	ISOLATED LAND SUBJECT TO FLOODING
IP	IRON PIPE
ISW	ISOLATED WETLANDS
LA	LANDSCAPED AREA
LOW	LIMIT OF WORK
N/F	NOW OR FORMERLY
NTS	NOT TO SCALE
OCS	OUTLET CONTROL STRUCTURE
PCC	PRECAST CONCRETE CURB
RW	RETAINING WALL
RCP	REINFORCED CONCRETE PIPE
SLC	STREET LIGHT CIRCUIT
SMH	SEWER MANHOLE
TEL	TOP OF CURB
TC	TELEPHONE CABLE
VGC	VERTICAL GRANITE CURB
WG	WATER GATE

	STONE BOUND W/DRILL HOLE		WATER VALVE
	STONE BOUND W/ESCUTCHEON PIN		CATCH BASIN
	CONCRETE BOUND		FIRE HYDRANT
	SEWER MANHOLE		TREE FILTER
	DRAIN MANHOLE		# OF PARKING SPACES
	WATER MANHOLE		SEWER MANHOLE
	ELECTRIC MANHOLE		
	TELEPHONE MANHOLE		FENCE LINE
	CABLE MANHOLE		PROPERTY LINE
	MANHOLE		WETLAND LINE/FLAG
	CATCH BASIN		(E) MAJOR CONTOUR
	HYDRANT		(E) MINOR CONTOUR
	WATER GATE		PROPOSED MAJOR CONTOUR
	GAS GATE		PROPOSED MINOR CONTOUR
	UTILITY POLE		100' WETLAND BUFFER ZONE
	UTILITY POLE W/LIGHT		25' NO DISTURB ZONE
	UTILITY POLE W/TRANSFORMER		WATER QUALITY UNIT/INLET
	LIGHT POLE		WATER QUALITY UNIT
	ELECTRIC HANDHOLE		
	HANDHOLE		
	SIGN		
	WETLANDS FLAG		
	BIT		
	CONC		
	EP		
	GC		
	WC		
	INVERT		
	(R)		
	SEWER LINE		
	DRAIN LINE		
	WATER LINE		
	GAS LINE		
	OVERHEAD WIRE		
	CHAIN LINK FENCE		
	STOCKADE FENCE		
	STEEL GUARDRAIL		
	TREELINE		
	BRUSHLINE		
	SURVEYED BUILDING LOCATION		
	GIS BUILDING LOCATION		



ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION



THORNDIKE PLACE NOTICE OF INTENT

IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

SEPTEMBER 6, 2023

[illegible]

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA



803 Summer Street
Boston, Massachusetts
02127

617 896 4300

SCALE: NONE

0 10 20 FEET

FILE: 2340702\C\D\2340702-LN

DWG.:	SHEET G-101
JOB NO: 23407 02	

PLAN REFERENCES

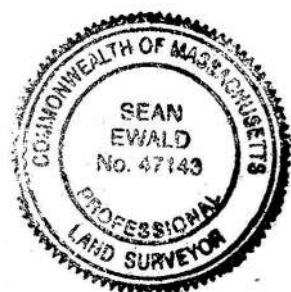
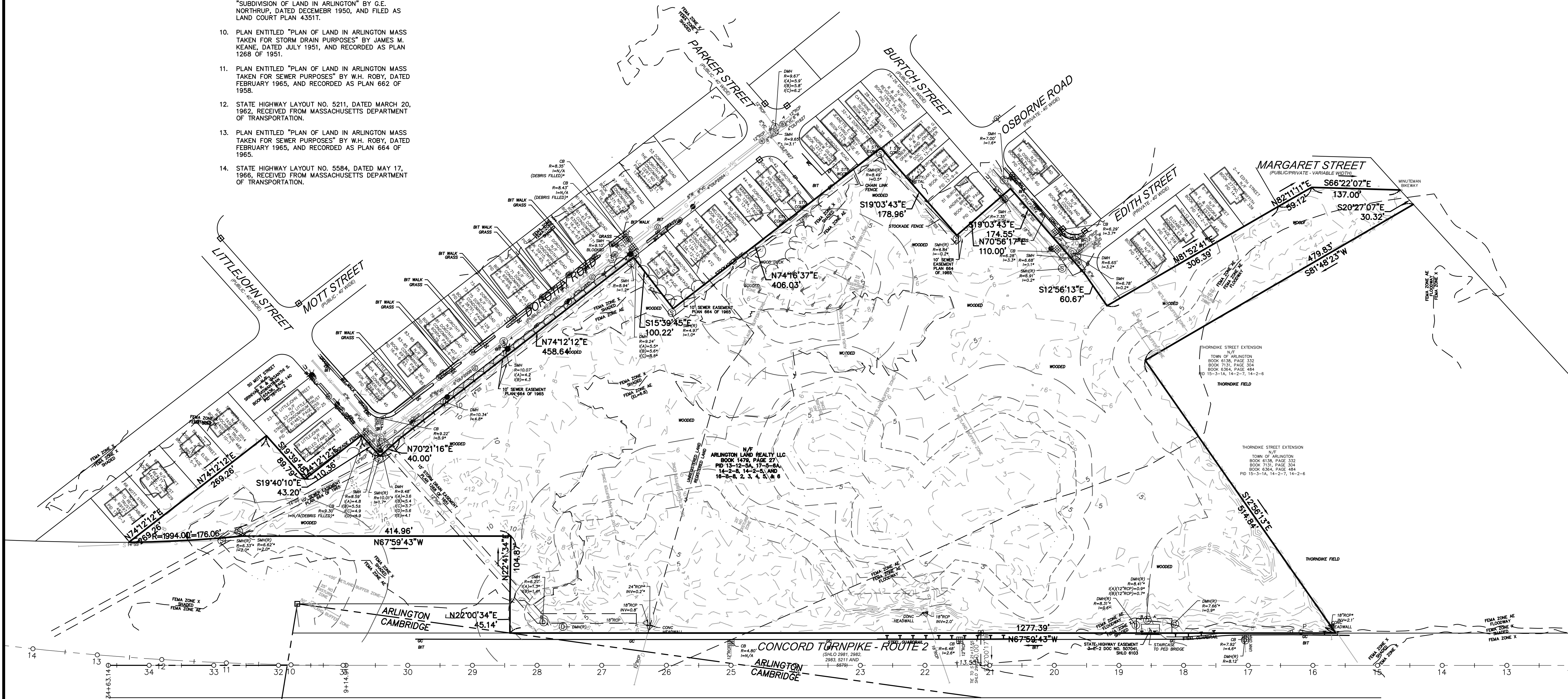
1. PLAN ENTITLED "PLAN AND PROFILE OF LITTLEJOHN STREET" BY FRANK AND DANIEL WYMAN, DATED DECEMBER 1926, AND RECEIVED FROM THE TOWN OF ARLINGTON.
2. PLAN ENTITLED "SUBDIVISION OF LAND IN ARLINGTON" BY BREMER W. POND, DATED APRIL 28, 1927, AND FILED AS LAND COURT PLAN 4351C.
3. PLAN ENTITLED "SUBDIVISION OF LAND SHOWN ON PLAN 4351A" BY J.M. KEANE, DATED OCTOBER 20, 1930, AND FILED AS LAND COURT PLAN 4351G.
4. PLAN ENTITLED "SUBDIVISION OF LAND SHOWN ON PLAN 4351A" BY J.M. KEANE, DATED APRIL 14, 1931, AND FILED AS LAND COURT PLAN 4351H.
5. STATE HIGHWAY LAYOUT NO. 2981, DATED JANUARY 17, 1933, RECEIVED FROM MASSACHUSETTS DEPARTMENT OF TRANSPORTATION.
6. STATE HIGHWAY LAYOUT NO. 2983, DATED JANUARY 17, 1933, RECEIVED FROM MASSACHUSETTS DEPARTMENT OF TRANSPORTATION.
7. PLAN ENTITLED "PLAN OF LAND IN ARLINGTON, MASS" BY C. H. GANNETT CO. CIVIL ENGINEERS, DATED APRIL 30, 1941, AND FILED AS LAND COURT PLAN 18030A.
8. PLAN ENTITLED "SUBDIVISION OF LAND IN ARLINGTON MASS" BY G.E. NORTHRUP, DATED DECEMBER 1948, AND RECORDED AS PLAN 1784 OF 1948.
9. PLAN ENTITLED "SUBDIVISION OF LAND IN ARLINGTON" BY G.E. NORTHRUP, DATED DECEMBER 1950, AND FILED AS LAND COURT PLAN 4351T. PLAN ENTITLED "SUBDIVISION OF LAND IN ARLINGTON" BY G.E. NORTHRUP, DATED DECEMBER 1950, AND FILED AS LAND COURT PLAN 4351T.
10. PLAN ENTITLED "PLAN OF LAND IN ARLINGTON MASS TAKEN FOR SEWER PURPOSES" BY JAMES M. KEANE, DATED JULY 1951, AND RECORDED AS PLAN 1268 OF 1951.
11. PLAN ENTITLED "PLAN OF LAND IN ARLINGTON MASS TAKEN FOR SEWER PURPOSES" BY W.H. ROBY, DATED FEBRUARY 1965, AND RECORDED AS PLAN 662 OF 1965.
12. STATE HIGHWAY LAYOUT NO. 5211, DATED MARCH 20, 1962, RECEIVED FROM MASSACHUSETTS DEPARTMENT OF TRANSPORTATION.
13. PLAN ENTITLED "PLAN OF LAND IN ARLINGTON MASS TAKEN FOR SEWER PURPOSES" BY W.H. ROBY, DATED FEBRUARY 1965, AND RECORDED AS PLAN 664 OF 1965.
14. STATE HIGHWAY LAYOUT NO. 5584, DATED MAY 17, 1966, RECEIVED FROM MASSACHUSETTS DEPARTMENT OF TRANSPORTATION.

GENERAL NOTES

1. THIS PLAN IS BASED UPON AN ON-THE-GROUND SURVEY PERFORMED BY BSC GROUP, INC. IN DECEMBER, 2019 AND JANUARY, 2020.
2. HORIZONTAL DATUM IS BASED UPON NAD '83 (12B) AS DERIVED VIA GPS OBSERVATIONS PERFORMED BY BSC GROUP, INC. IN DECEMBER 2019.
3. VERTICAL DATUM IS BASED UPON NAVD '88 AS DERIVED VIA GPS OBSERVATIONS PERFORMED BY BSC GROUP, INC. IN DECEMBER, 2019.
TBM 18-1 ELEV=9.13'
DESC: BACK LEFT BOLT ON HYDRANT ON OSBORNE
TBM 18-2 ELEV=11.61'
DESC: FRONT BOLT ON HYDRANT ACROSS FROM UTILITY POLE # 8
TBM 18-3 ELEV=11.71'
DESC: BACK LEFT BOLT ON HYDRANT BETWEEN UNITS
4. LOCUS IS LOCATED WITHIN ZONES ZONES AE, AE FLOODWAY, X AND X SHADED AS GRAPHICALLY DEPICTED ON FLOOD INSURANCE RATE MAP NUMBER 25017C0419E, EFFECTIVE DATE JUNE 4, 2010.
5. WETLAND RESOURCE AREAS SHOWN HEREON WERE DELINEATED BY BSC GROUP, INC. IN JANUARY AND OCTOBER 2020.
6. UTILITY RECORDS HEREON DENOTED WITH "U" ARE FROM EXISTING CONDITIONS SURVEY PREPARED BY PRECISION LAND SURVEYING OF SOUTHBOROUGH, MA IN 2009.
7. CONTOURS SHOWN WITHIN WOODED AREAS ARE BASED UPON AERIAL LIDAR COLLECTED UNDER USGS CONTRACT DURING 2013-2014. DATA MEETS OR EXCEEDS Q12 USGS SPECIFICATIONS. BSC GROUP FOUND A MEAN ERROR OF 0.20'(OBSCURED) & 0.16'(UNOBSCURED) ACROSS 15 LOCATIONS SAMPLED DURING THE ON-THE-GROUND SURVEY IN DECEMBER 2019.
8. TOWN LINE LOCATIONS ESTABLISHED FROM MASSACHUSETTS STATE HIGHWAY LAYOUTS 2981, 2982, 2983, 5211 AND 5579.
9. ABUTTING BOUNDARY LINES ARE APPROXIMATE.
10. RECORD UTILITY INFORMATION WAS NOT RECEIVED FROM VERIZON, TENNESSEE GAS AND MCI.

UTILITY NOTE

EXISTING UTILITIES, WHERE SHOWN HEREON, ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING ANY ON-SITE ACTIVITY WITH DIG-SAFE AND THE APPROPRIATE UTILITY COMPANY AND MAINTAINING EXISTING UTILITY SYSTEM SERVICE. DIG-SAFE SHALL BE NOTIFIED PER THE COMMONWEALTH OF MASSACHUSETTS STATUTE CHAPTER 82, SECTION 40, AT 1-888-344-7233. NO GUARANTEE IS IMPLIED OR INTENDED AS TO THE ACCURACY, LOCATION OR THAT ALL UTILITIES AND/OR SUBSURFACE STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION AND INVERTS OR UTILITIES OR STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION.



PROFESSIONAL LAND SURVEYOR
FOR BSC GROUP, INC.

9/5/23
DATE

THORNDIKE PLACE
NOTICE OF INTENT

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

EXISTING
CONDITIONS

SEPTEMBER 6, 2023

REVISIONS:

NO.	DATE	DESC.

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA



803 Summer Street
Boston, Massachusetts
02127

617 896 4300

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SCALE: 1" = 80'

0 40 80 160 FEET

FILE: 2340702_C\2340702-EC

DWG.: SHEET V-100

JOB. NO: 23407.02

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NOT FOR CONSTRUCTION



PROFESSIONAL ENGINEER

THORNDIKE PLACE
NOTICE OF INTENT

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

EXISTING
ENVIRONMENTAL
RESOURCE PLAN

SEPTEMBER 6, 2023

REVISIONS:

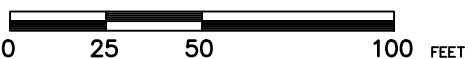
NO.	DATE	DESC.

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

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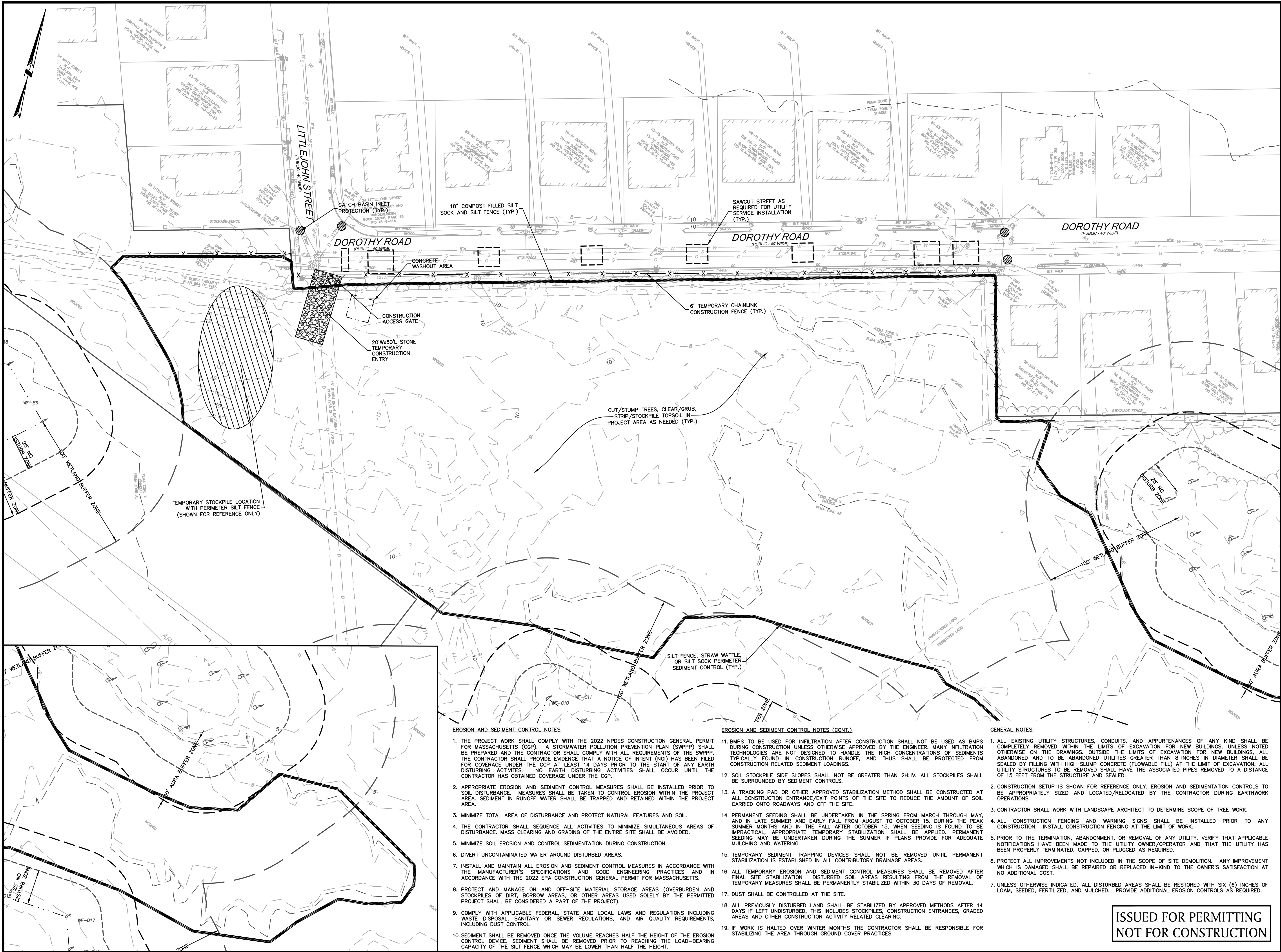
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FILE: 2340702\C\2340702-CONSTRAINTS

DWG.: SHEET C-100

JOB. NO: 23407.02



EROSION AND SEDIMENT CONTROL NOTES

1. THE PROJECT WORK SHALL COMPLY WITH THE 2022 NPDES CONSTRUCTION GENERAL PERMIT FOR MASSACHUSETTS (CGP). A STORMWATER POLLUTION PREVENTION PLAN (SWPPP) SHALL BE PREPARED AND THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE SWPPP. THE CONTRACTOR SHALL PROVIDE EVIDENCE THAT A NOTICE OF INTENT (NOI) HAS BEEN FILED FOR COVERAGE UNDER THE CGP AT LEAST 14 DAYS PRIOR TO THE START OF ANY EARTH DISTURBING ACTIVITIES. NO EARTH DISTURBING ACTIVITIES SHALL OCCUR UNTIL THE CONTRACTOR HAS OBTAINED COVERAGE UNDER THE CGP.
2. APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO SOIL DISTURBANCE. MEASURES SHALL BE TAKEN TO CONTROL EROSION WITHIN THE PROJECT AREA. SEDIMENT IN RUNOFF WATER SHALL BE TRAPPED AND RETAINED WITHIN THE PROJECT AREA.
3. MINIMIZE TOTAL AREA OF DISTURBANCE AND PROTECT NATURAL FEATURES AND SOIL.
4. THE CONTRACTOR SHALL SEQUENCE ALL ACTIVITIES TO MINIMIZE SIMULTANEOUS AREAS OF DISTURBANCE. MASS CLEARING AND GRADING OF THE ENTIRE SITE SHALL BE AVOIDED.
5. MINIMIZE SOIL EROSION AND CONTROL SEDIMENTATION DURING CONSTRUCTION.
6. DIVERT UNCONTAMINATED WATER AROUND DISTURBED AREAS.
7. INSTALL AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND GOOD ENGINEERING PRACTICES AND IN ACCORDANCE WITH THE 2022 EPA CONSTRUCTION GENERAL PERMIT FOR MASSACHUSETTS.
8. PROTECT AND MANAGE ON AND OFF-SITE MATERIAL STORAGE AREAS (OVERBURDEN AND STOCKPILES OF DIRT, BORROW AREAS, OR OTHER AREAS USED SOLELY BY THE PERMITTED PROJECT SHALL BE CONSIDERED A PART OF THE PROJECT).
9. COMPLY WITH APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS INCLUDING WASTE DISPOSAL, SANITARY OR SEWER REGULATIONS, AND AIR QUALITY REQUIREMENTS, INCLUDING DUST CONTROL.
10. SEDIMENT SHALL BE REMOVED ONCE THE VOLUME REACHES HALF THE HEIGHT OF THE EROSION CONTROL DEVICE. SEDIMENT SHALL BE REMOVED PRIOR TO REACHING THE LOAD-BEARING CAPACITY OF THE SILT FENCE WHICH MAY BE LOWER THAN HALF THE HEIGHT.

EROSION AND SEDIMENT CONTROL NOTES (CONT.)

11. BMPs TO BE USED FOR INFILTRATION AFTER CONSTRUCTION SHALL NOT BE USED AS BMPs DURING CONSTRUCTION UNLESS OTHERWISE APPROVED BY THE ENGINEER. MANY INFILTRATION TECHNOLOGIES ARE NOT DESIGNED TO HANDLE THE HIGH CONCENTRATIONS OF SEDIMENTS TYPICALLY FOUND IN CONSTRUCTION RUNOFF, AND THUS SHALL BE PROTECTED FROM CONSTRUCTION RELATED SEDIMENT LOADINGS.
12. SOIL STOCKPILE SIDE SLOPES SHALL NOT BE GREATER THAN 2H:1V. ALL STOCKPILES SHALL BE SURROUNDED BY SEDIMENT CONTROLS.
13. A TRACKING PAD OR OTHER APPROVED STABILIZATION METHOD SHALL BE CONSTRUCTED AT ALL CONSTRUCTION ENTRANCE/EXIT POINTS OF THE SITE TO REDUCE THE AMOUNT OF SOIL CARRIED ONTO ROADWAYS AND OFF THE SITE.
14. PERMANENT SEEDING SHALL BE UNDERTAKEN IN THE SPRING FROM MARCH THROUGH MAY, AND IN LATE SUMMER AND EARLY FALL FROM AUGUST TO OCTOBER 15. DURING THE PEAK SUMMER MONTHS AND IN THE FALL AFTER OCTOBER 15, WHEN SEEDING IS FOUND TO BE IMPRACTICAL, APPROPRIATE TEMPORARY STABILIZATION SHALL BE APPLIED. PERMANENT SEEDING MAY BE UNDERTAKEN DURING THE SUMMER IF PLANS PROVIDE FOR ADEQUATE MULCHING AND WATERING.
15. TEMPORARY SEDIMENT TRAPPING DEVICES SHALL NOT BE REMOVED UNTIL PERMANENT STABILIZATION IS ESTABLISHED IN ALL CONTRIBUTORY DRAINAGE AREAS.
16. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED AFTER FINAL SITE STABILIZATION. DISTURBED SOIL AREAS RESULTING FROM THE REMOVAL OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED WITHIN 30 DAYS OF REMOVAL.
17. DUST SHALL BE CONTROLLED AT THE SITE.
18. ALL PREVIOUSLY DISTURBED LAND SHALL BE STABILIZED BY APPROVED METHODS AFTER 14 DAYS IF LEFT UNDISTURBED, THIS INCLUDES STOCKPILES, CONSTRUCTION ENTRANCES, GRADED AREAS AND OTHER CONSTRUCTION ACTIVITY RELATED CLEARING.
19. IF WORK IS HALTED OVER WINTER MONTHS THE CONTRACTOR SHALL BE RESPONSIBLE FOR STABILIZING THE AREA THROUGH GROUND COVER PRACTICES.

GENERAL NOTES:

1. ALL EXISTING UTILITY STRUCTURES, CONDUITS, AND APPURTENANCES OF ANY KIND SHALL BE COMPLETELY REMOVED WITHIN THE LIMITS OF EXCAVATION FOR NEW BUILDINGS. UNLESS NOTED OTHERWISE ON THE DRAWINGS, OUTSIDE THE LIMITS OF EXCAVATION FOR NEW BUILDINGS, ALL ABANDONED AND TO-BE-ABANDONED UTILITIES GREATER THAN 8 INCHES IN DIAMETER SHALL BE SEALED BY FILLING WITH HIGH SLUMP CONCRETE (FLOWABLE FILL) AT THE LIMIT OF EXCAVATION. ALL UTILITY STRUCTURES TO BE REMOVED SHALL HAVE THE ASSOCIATED PIPES REMOVED TO A DISTANCE OF 15 FEET FROM THE STRUCTURE AND SEALED.
2. CONSTRUCTION SETUP IS SHOWN FOR REFERENCE ONLY. EROSION AND SEDIMENTATION CONTROLS TO BE APPROPRIATELY SIZED AND LOCATED/RELOCATED BY THE CONTRACTOR DURING EARTHWORK OPERATIONS.
3. CONTRACTOR SHALL WORK WITH LANDSCAPE ARCHITECT TO DETERMINE SCOPE OF TREE WORK.
4. ALL CONSTRUCTION FENCING AND WARNING SIGNS SHALL BE INSTALLED PRIOR TO ANY CONSTRUCTION. INSTALL CONSTRUCTION FENCING AT THE LIMIT OF WORK.
5. PRIOR TO THE TERMINATION, ABANDONMENT, OR REMOVAL OF ANY UTILITY, VERIFY THAT APPLICABLE NOTIFICATIONS HAVE BEEN MADE TO THE UTILITY OWNER/OPERATOR AND THAT THE UTILITY HAS BEEN PROPERLY TERMINATED, CAPPED, OR PLUGGED AS REQUIRED.
6. PROTECT ALL IMPROVEMENTS NOT INCLUDED IN THE SCOPE OF SITE DEMOLITION. ANY IMPROVEMENT WHICH IS DAMAGED SHALL BE REPAIRED OR REPLACED IN-KIND TO THE OWNER'S SATISFACTION AT NO ADDITIONAL COST.
7. UNLESS OTHERWISE INDICATED, ALL DISTURBED AREAS SHALL BE RESTORED WITH SIX (6) INCHES OF LOAM, SEED, FERTILIZED, AND MULCHED. PROVIDE ADDITIONAL EROSION CONTROLS AS REQUIRED.

**ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION**



PROFESSIONAL ENGINEER

**THORNDIKE PLACE
NOTICE OF INTENT**

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

SITE PREPARATION PLAN

SEPTEMBER 6, 2023

REVISIONS:

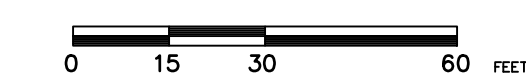
NO.	DATE	DESC.

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

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SCALE: 1" = 30'

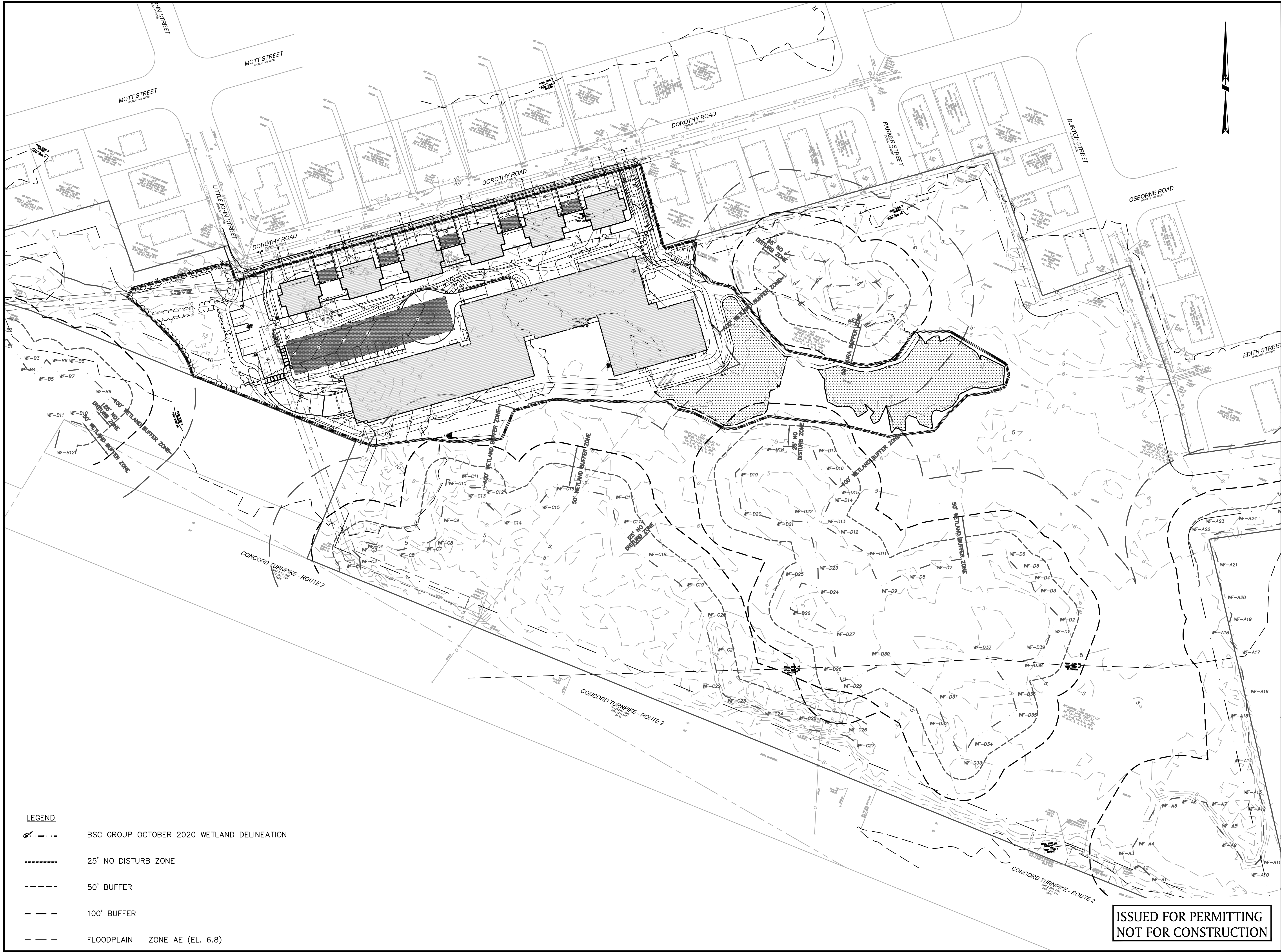


FILE: 2340702\CD\2340702-PREP

DWG:

JOB. NO: 23407.02

SHEET C-101



PROFESSIONAL ENGINEER

THORNDIKE PLACE NOTICE OF INTENT

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

OVERALL SITE PLAN

SEPTEMBER 6, 2023

REVISIONS:

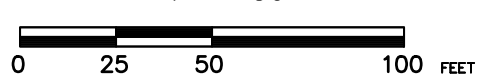
NO.	DATE	DESC.

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

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SCALE: 1" = 50'

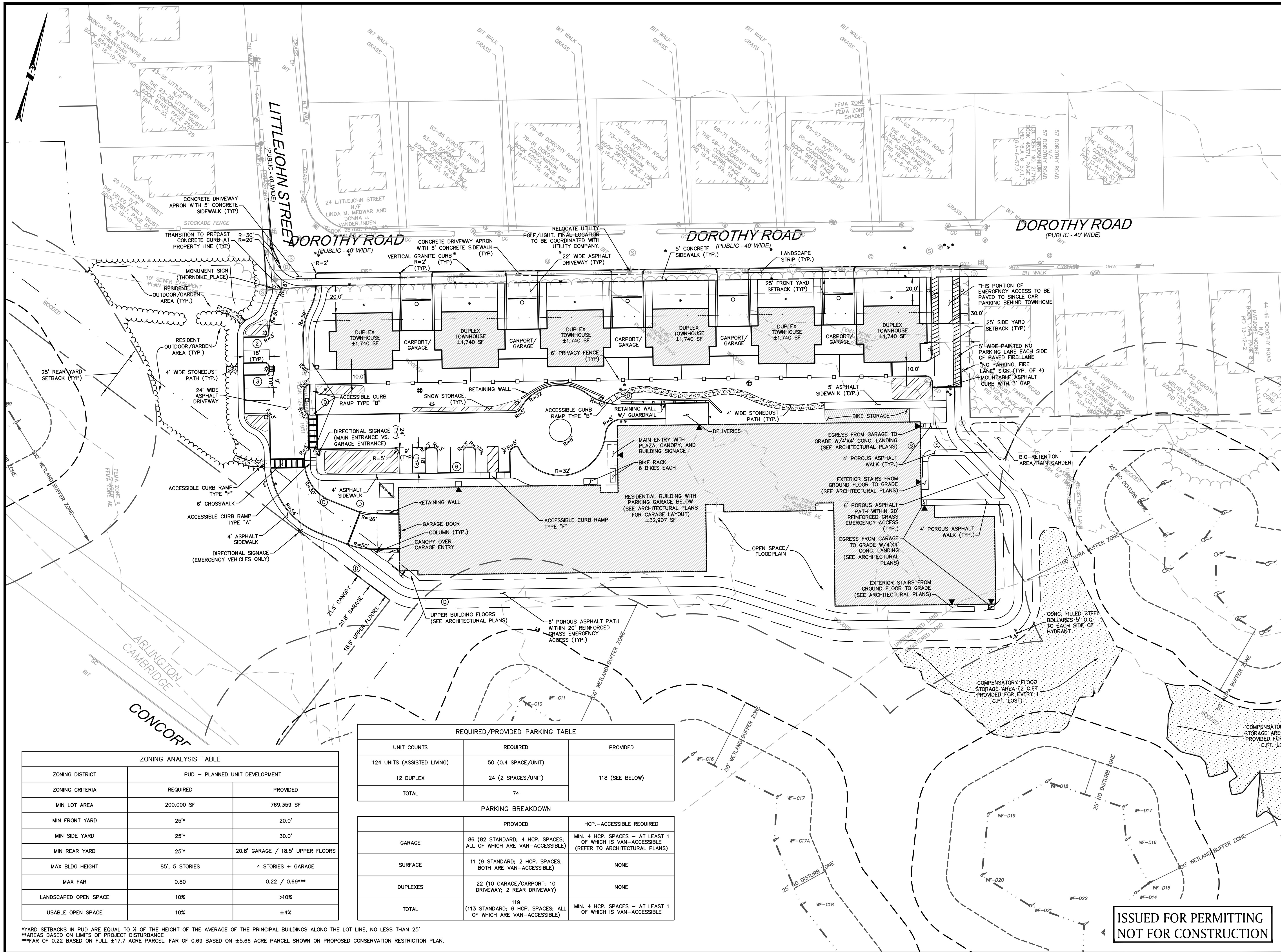


FILE: 2340702\C\D\2340702-SP2

DWG.:

JOB. NO: 23407.02

SHEET C-102



ZONING ANALYSIS TABLE		
PUD - PLANNED UNIT DEVELOPMENT		
ZONING DISTRICT	PUD - PLANNED UNIT DEVELOPMENT	
ZONING CRITERIA	REQUIRED	PROVIDED
MIN LOT AREA	200,000 SF	769,359 SF
MIN FRONT YARD	25'	20.0'
MIN SIDE YARD	25'	30.0'
MIN REAR YARD	25'	20.8' GARAGE / 18.5' UPPER FLOORS
MAX BLDG HEIGHT	85', 5 STORIES	4 STORIES + GARAGE
MAX FAR	0.80	0.22 / 0.69***
LANDSCAPED OPEN SPACE	10%	>10%
USABLE OPEN SPACE	10%	±4%

*YARD SETBACKS IN PUD ARE EQUAL TO 1/4 OF THE HEIGHT OF THE AVERAGE OF THE PRINCIPAL BUILDINGS ALONG THE LOT LINE, NO LESS THAN 25'
**AREAS BASED ON LIMITS OF PROJECT DISTURBANCE
***FAR OF 0.22 BASED ON FULL ±17.7 ACRE PARCEL. FAR OF 0.69 BASED ON ±5.66 ACRE PARCEL SHOWN ON PROPOSED CONSERVATION RESTRICTION PLAN.

REQUIRED/PROVIDED PARKING TABLE		
UNIT COUNTS	REQUIRED	PROVIDED
124 UNITS (ASSISTED LIVING)	50 (0.4 SPACE/UNIT)	118 (SEE BELOW)
12 DUPLEX	24 (2 SPACES/UNIT)	
TOTAL	74	

PARKING BREAKDOWN		
	PROVIDED	HCP.-ACCESSIBLE REQUIRED
GARAGE	86 (82 STANDARD; 4 HCP. SPACES; ALL OF WHICH ARE VAN-ACCESSIBLE)	MIN. 4 HCP. SPACES - AT LEAST 1 OF WHICH IS VAN-ACCESSIBLE (REFER TO ARCHITECTURAL PLANS)
SURFACE	11 (9 STANDARD; 2 HCP. SPACES, BOTH ARE VAN-ACCESSIBLE)	NONE
DUPLEXES	22 (10 GARAGE/CARPORT; 10 DRIVEWAY; 2 REAR DRIVEWAY)	NONE
TOTAL	119 (113 STANDARD; 6 HCP. SPACES; ALL OF WHICH ARE VAN-ACCESSIBLE)	MIN. 4 HCP. SPACES - AT LEAST 1 OF WHICH IS VAN-ACCESSIBLE



PROFESSIONAL ENGINEER

THORNDIKE PLACE
NOTICE OF INTENT

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

LAYOUT & MATERIALS
PLAN

SEPTEMBER 6, 2023

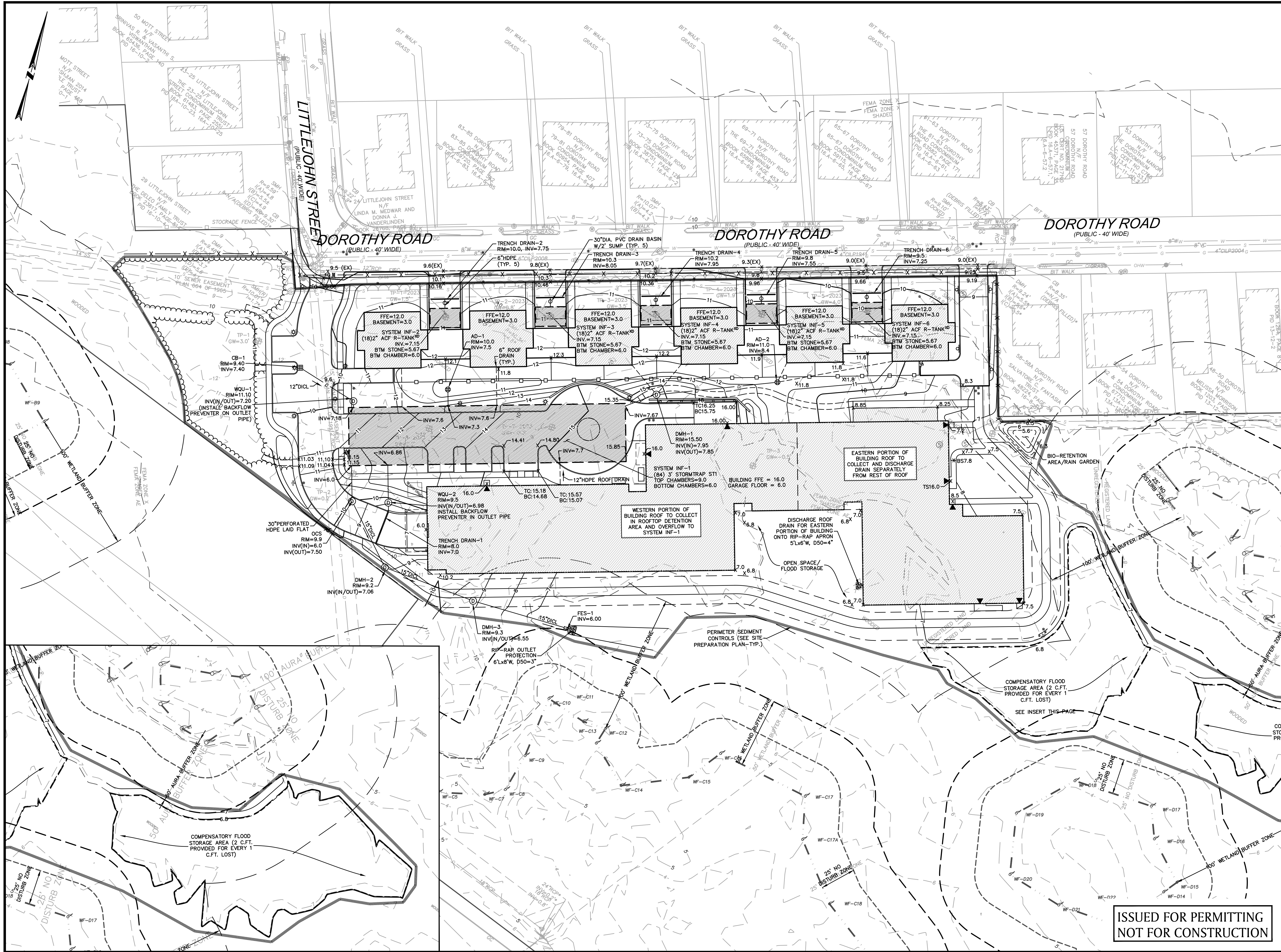
REVISIONS:		
NO.	DATE	DESC.

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

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SCALE: 1" = 30'
0 15 30 60 FEET
FILE: 2340702\CD\2340702-LM
DWG.:
JOB. NO: 23407.02 SHEET C-103

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PROFESSIONAL ENGINEER

THORNDIKE PLACE NOTICE OF INTENT

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

GRADING & DRAINAGE PLAN

SEPTEMBER 6, 2023

REVISIONS:

NO.	DATE	DESC.

PREPARED FOR:
ARLINGTON LAND REALTY, LLC
84 SHERMAN STREET, 2ND FLOOR
CAMBRIDGE, MA



803 Summer Street
Boston, Massachusetts
02127

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SCALE: 1" = 30'



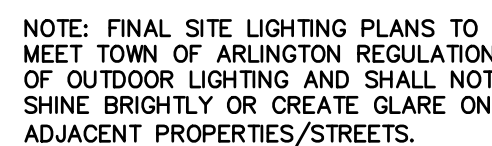
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DWG:

JOB. NO: 23407.02

SHEET C-104

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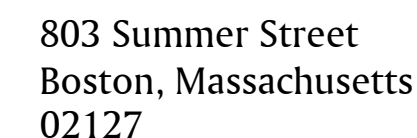
DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

UTILITY PLAN

SEPTEMBER 6, 2023

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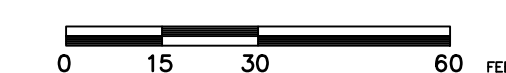
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SCALE: 1" = 30'

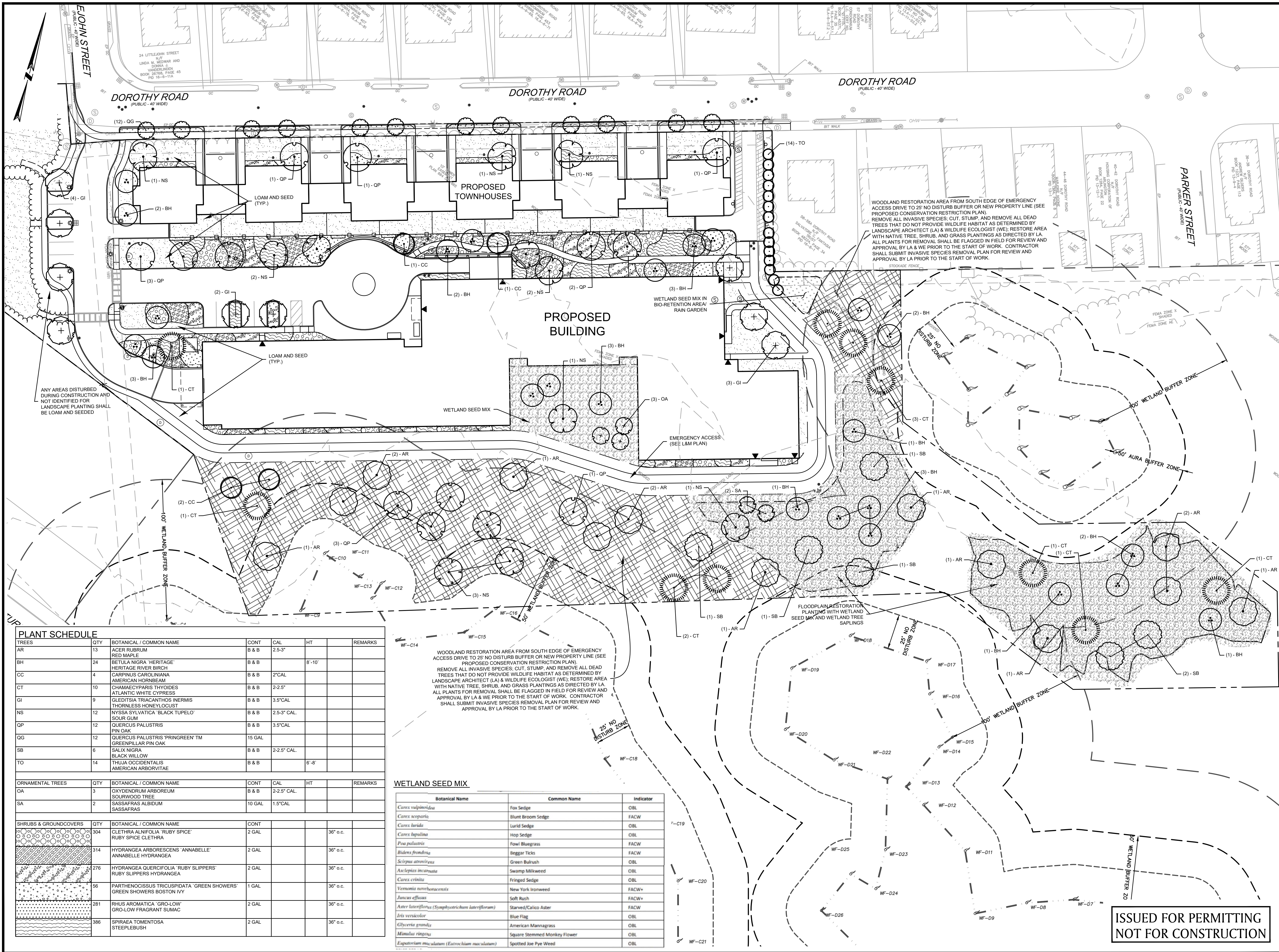


FILE: 2340702\C\D\2340702-UT

JOB. NO: 23407.02

SHEET C-105

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PLANT SCHEDULE						
TREES	QTY	BOTANICAL / COMMON NAME	CONT	CAL	HT	REMARKS
AR	13	ACER RUBRUM RED MAPLE	B & B	2.5" CAL	8'-10'	
BH	24	BETULA NIGRA 'HERITAGE' HERITAGE RIVER BIRCH	B & B	2" CAL		
CC	4	CARPINUS CAROLINIANA AMERICAN HORNBEAM	B & B	2" CAL		
CT	10	CHAMAECYPARIS THYOIDES ATLANTIC WHITE CYPRESS	B & B	2-2.5"		
GI	9	GLEDITSIA TRIACANTHOS 'NERMIS' THORNLESS HONEYLOCUST	B & B	3.5" CAL		
NS	12	NYSSA SYLVATICA 'BLACK TUPELO' SOUR GUM	B & B	2.5-3" CAL		
QP	12	QUERCUS PALUSTRIS PIN OAK	B & B	3.5" CAL		
QG	12	QUERCUS PALUSTRIS 'PRINGREEN' TM GREENPILLAR PIN OAK	15 GAL			
SB	6	SALIX NIGRA BLACK WILLOW	B & B	2-2.5" CAL		
TO	14	THUJA OCCIDENTALIS AMERICAN ARBORVITAE	B & B		6'-8'	
ORNAMENTAL TREES	QTY	BOTANICAL / COMMON NAME	CONT	CAL	HT	REMARKS
OA	3	OXYDENDRUM ARBOREUM SOURWOOD TREE	B & B	2-2.5" CAL		
SA	2	SASSAFRAS ALBIDUM SASSAFRAS	10 GAL	1.5" CAL		
SHRUBS & GROUNDCOVERS	QTY	BOTANICAL / COMMON NAME	CONT			
	304	CLETHRA ALNIFOLIA 'RUBY SPICE' RUBY SPICE CLETHRA	2 GAL		36" o.c.	
	314	HYDRANGEA ARBORESCENS 'ANNABELLE' ANNABELLE HYDRANGEA	2 GAL		36" o.c.	
	276	HYDRANGEA QUERCIFOLIA 'RUBY SLIPPERS' RUBY SLIPPERS HYDRANGEA	2 GAL		36" o.c.	
	56	PARTHENOCISSUS TRICUSPIDATA 'GREEN SHOWERS' GREEN SHOWERS BOSTON IVY	1 GAL		36" o.c.	
	281	RHUS AROMATICA 'GRO-LOW' GRO-LOW FRAGRANT SUMAC	2 GAL		36" o.c.	
	386	SPIRAEA TOMENTOSA STEEPLEBUSH	2 GAL		36" o.c.	

WETLAND SEED MIX		
Botanical Name	Common Name	Indicator
Carex vulpinoidea	Fox Sedge	OBL
Carex scoparia	Blunt Broom Sedge	FACW
Carex lasiocarpa	Lurid Sedge	OBL
Carex lupulina	Hop Sedge	OBL
Poa palustris	Fowl Bluegrass	FACW
Bidens frondosa	Beggar Ticks	FACW
Scirpus atrovirens	Green Bulrush	OBL
Asclepias incarnata	Swamp Milkweed	OBL
Carex crinita	Fringed Sedge	OBL
Vernonia noveboracensis	New York Ironweed	FACW+
Juncus effusus	Soft Rush	FACW+
Aster lateriflorus (Symphyotrichum lateriflorum)	Starved/Calico Aster	FACW
Iris versicolor	Blue Flag	OBL
Glyceria grandis	American Mannagrass	OBL
Mimulus ringens	Square Stemmed Monkey Flower	OBL
Eupatorium maculatum (Eutrochium maculatum)	Spotted Joe Pye Weed	OBL

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION



REGISTERED LANDSCAPE ARCHITECT

THORNDIKE PLACE
NOTICE OF INTENT

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

PLANTING PLAN

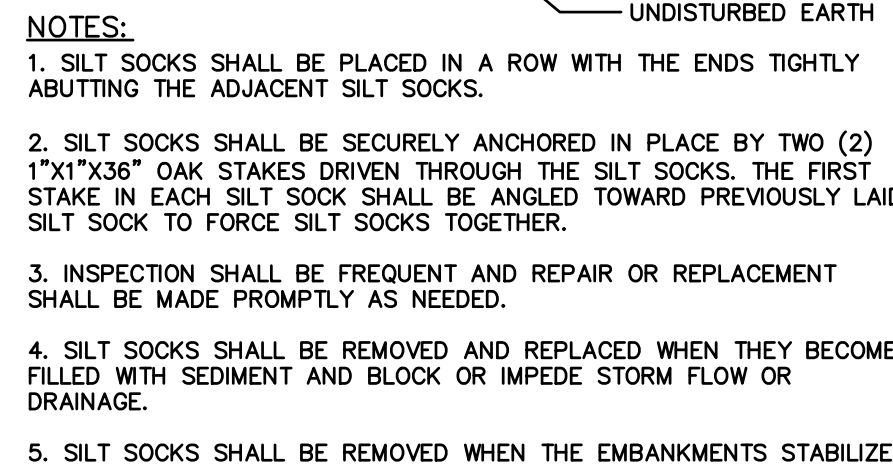
SEPTEMBER 6, 2023

REVISIONS:		
NO.	DATE	DESC.

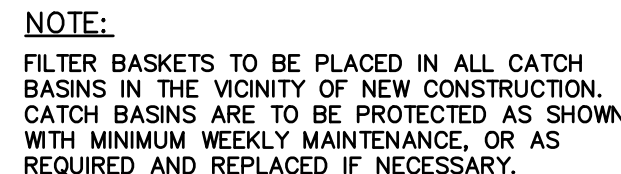
PREPARED FOR:
ARLINGTON LAND REALTY, LLC
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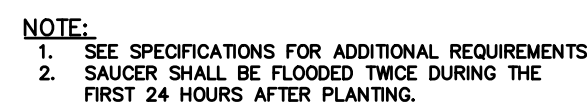
© 2023 BSC Group, Inc.
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0 15 30 60 FEET
FILE: 2340702\L\2340702-LSC
DWG: SHEET L-100
JOB. NO: 23407.02



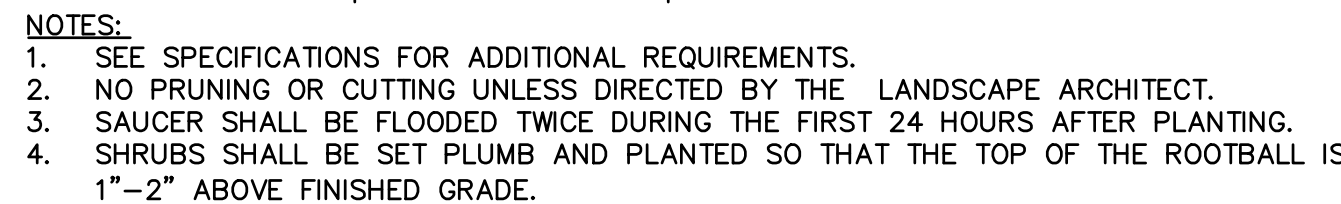
SCALE: NONE



SCALE: NONE



SCALE: NONE



SCALE: NONE



NOTES:

1. BASED ON A DESIGN SLOPE OF 7.5% & A REVEAL OF 6".
2. SLOPE TOLERANCE FOR CONSTRUCTION = $\pm 0.50\%$
3. THE MAX. ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE 5%.
4. THE MAX. ALLOWABLE SLOPE OF ACCESSIBLE ROUTE CURB RAMPS SHALL BE 7.5%.
5. A MINIMUM OF 3 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E. HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.).
6. BASE OF RAMP SHALL BE GRADED TO PREVENT PONDING.



IN

SEPTEMBER 6, 2023

[illegible]

617 896 4300

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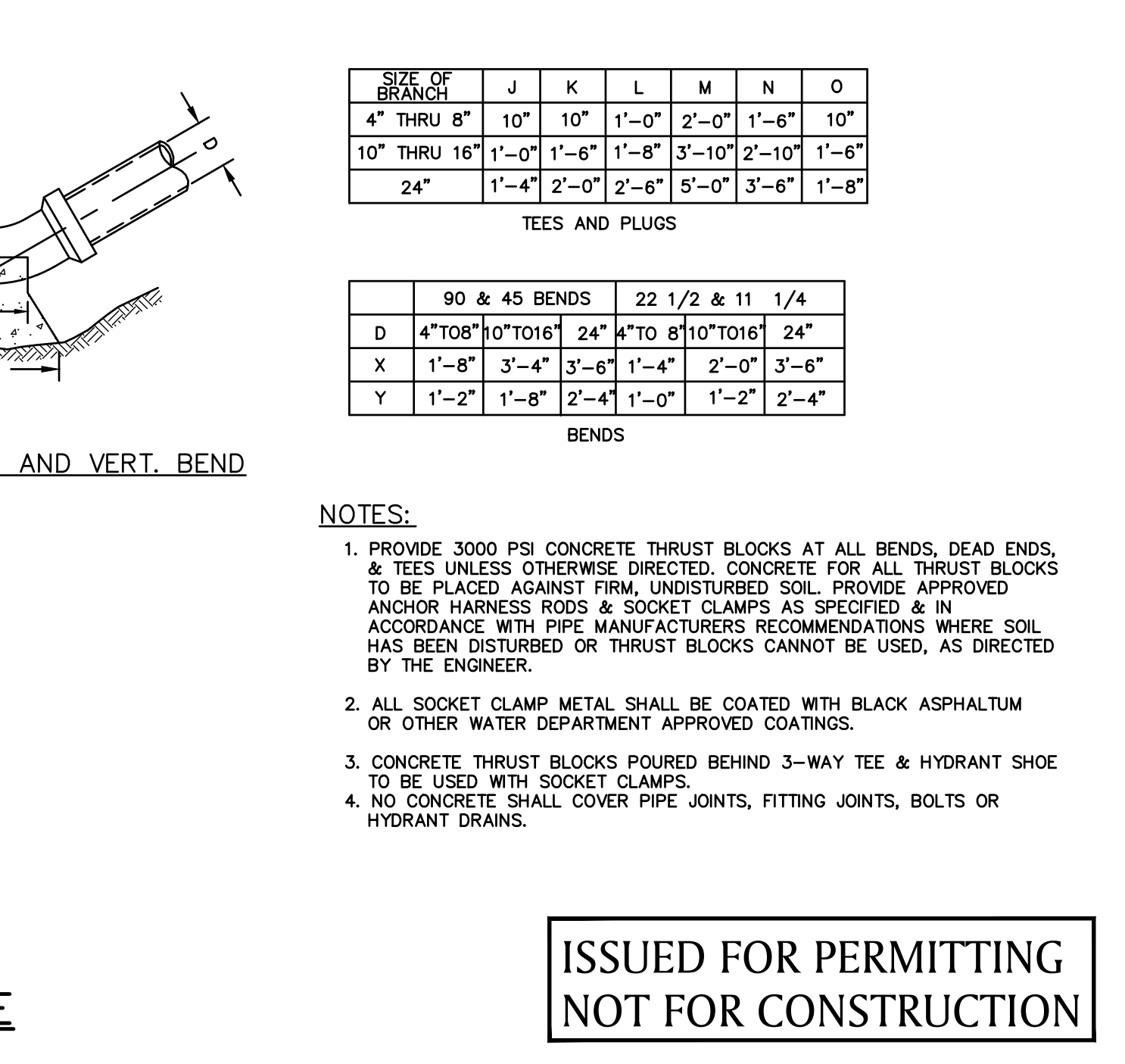
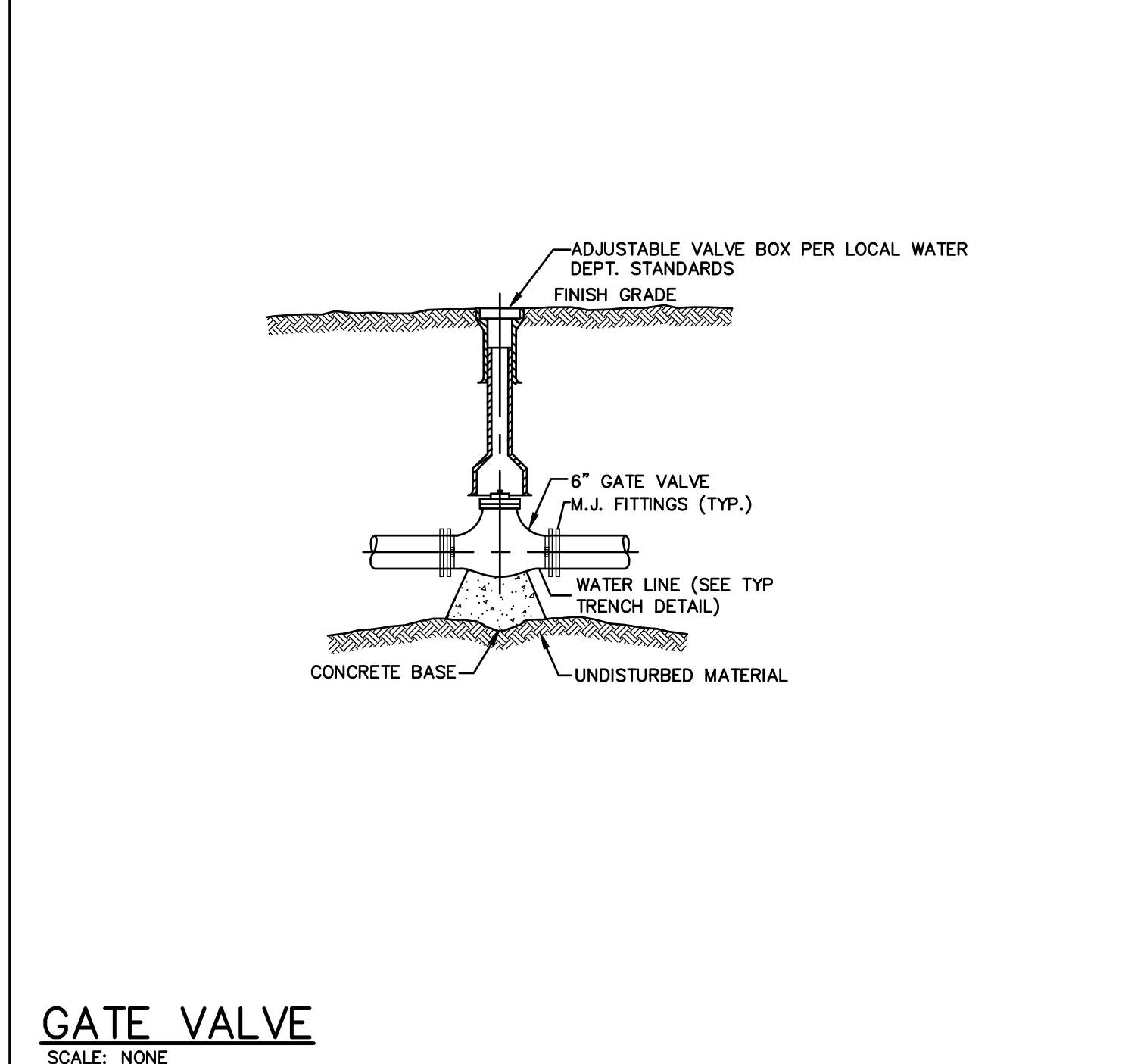
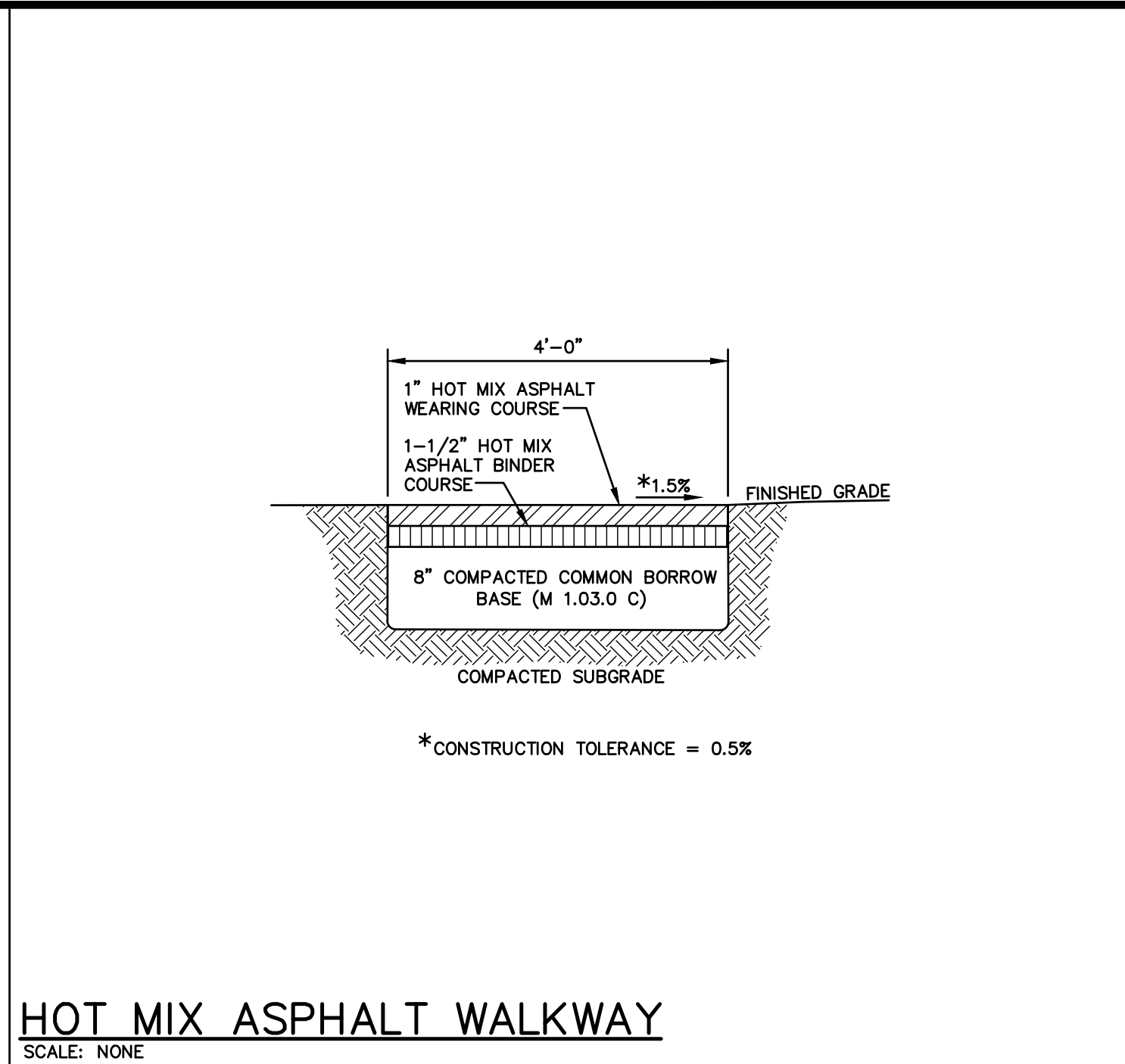
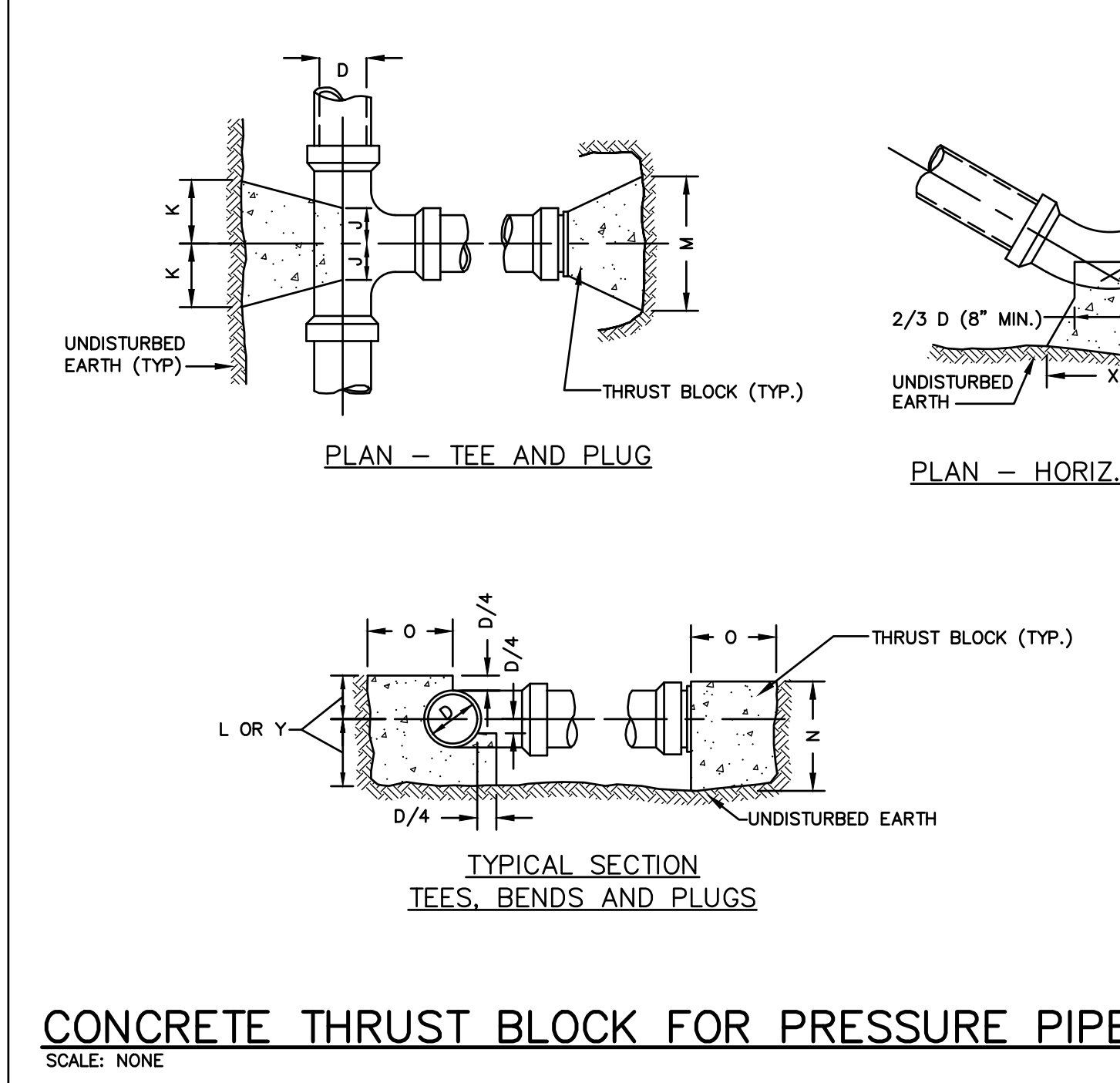
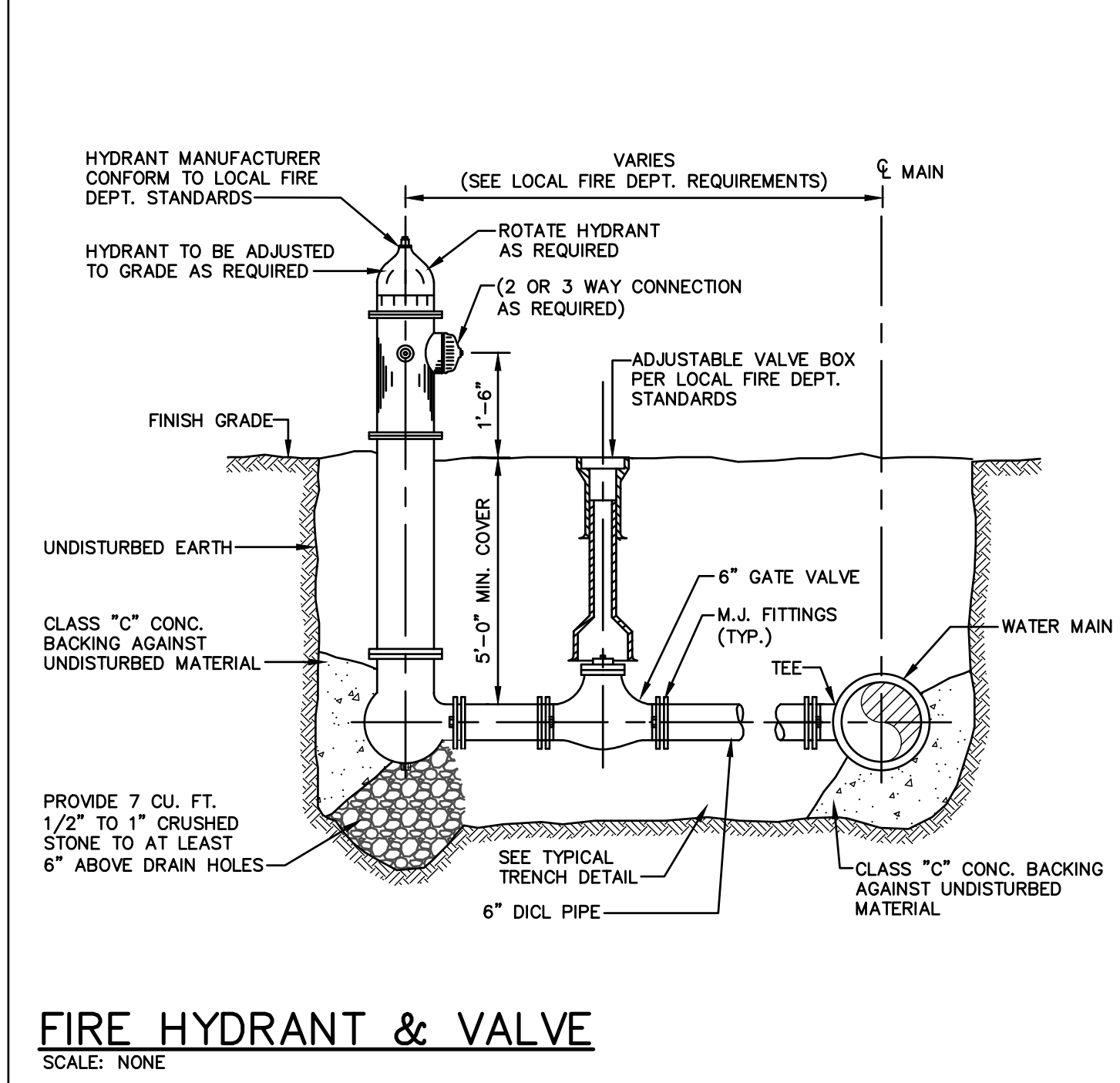
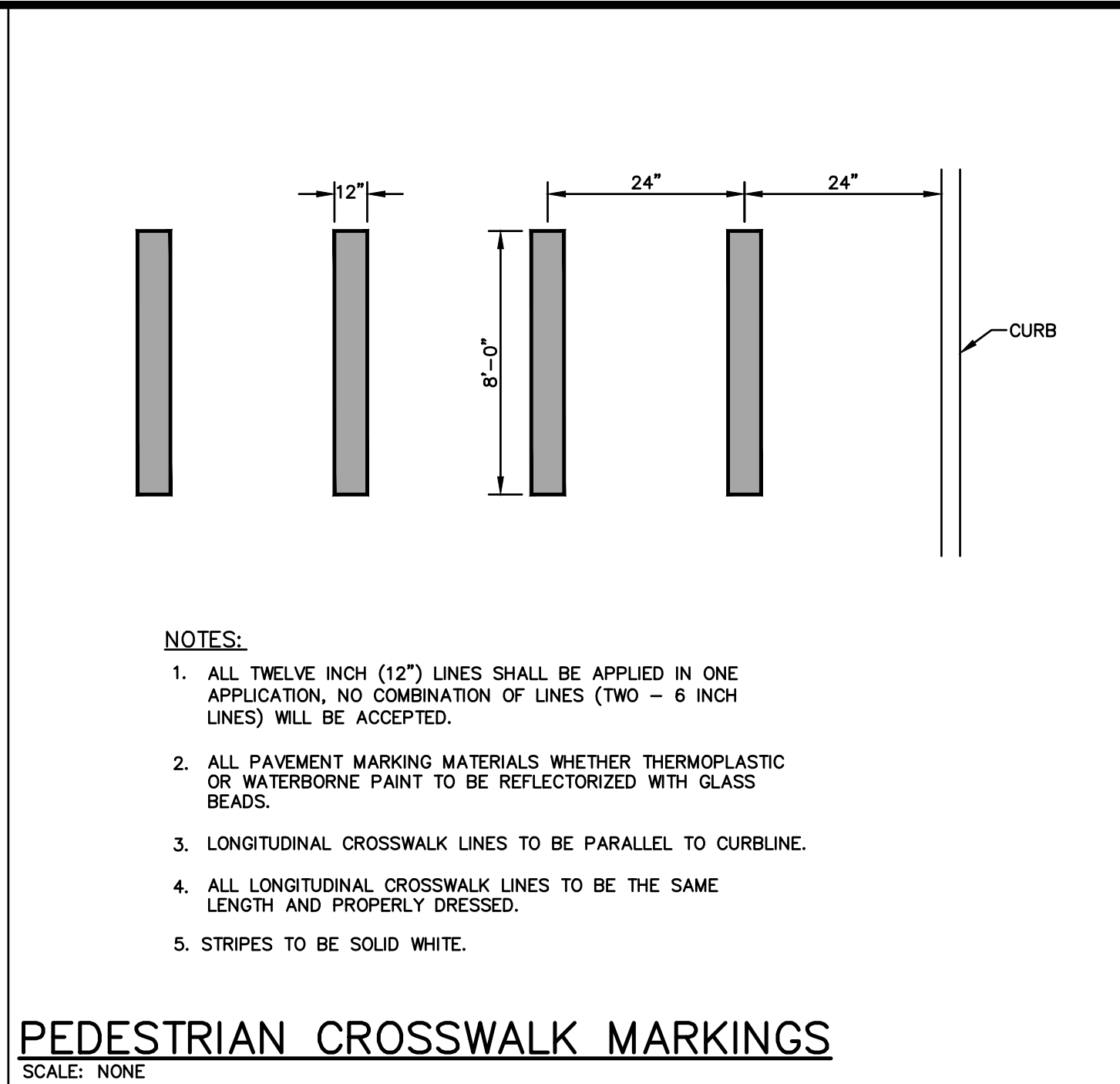
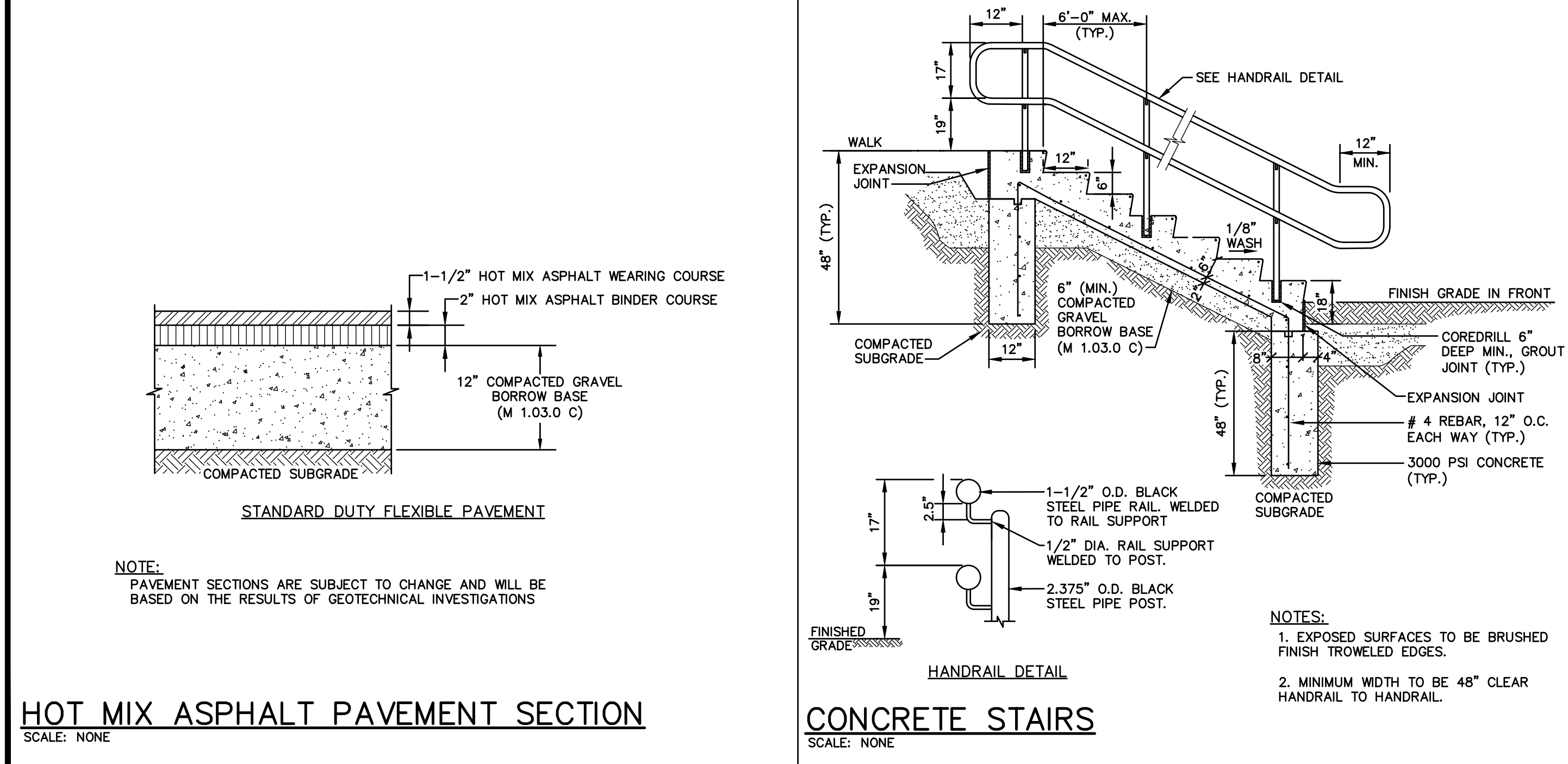
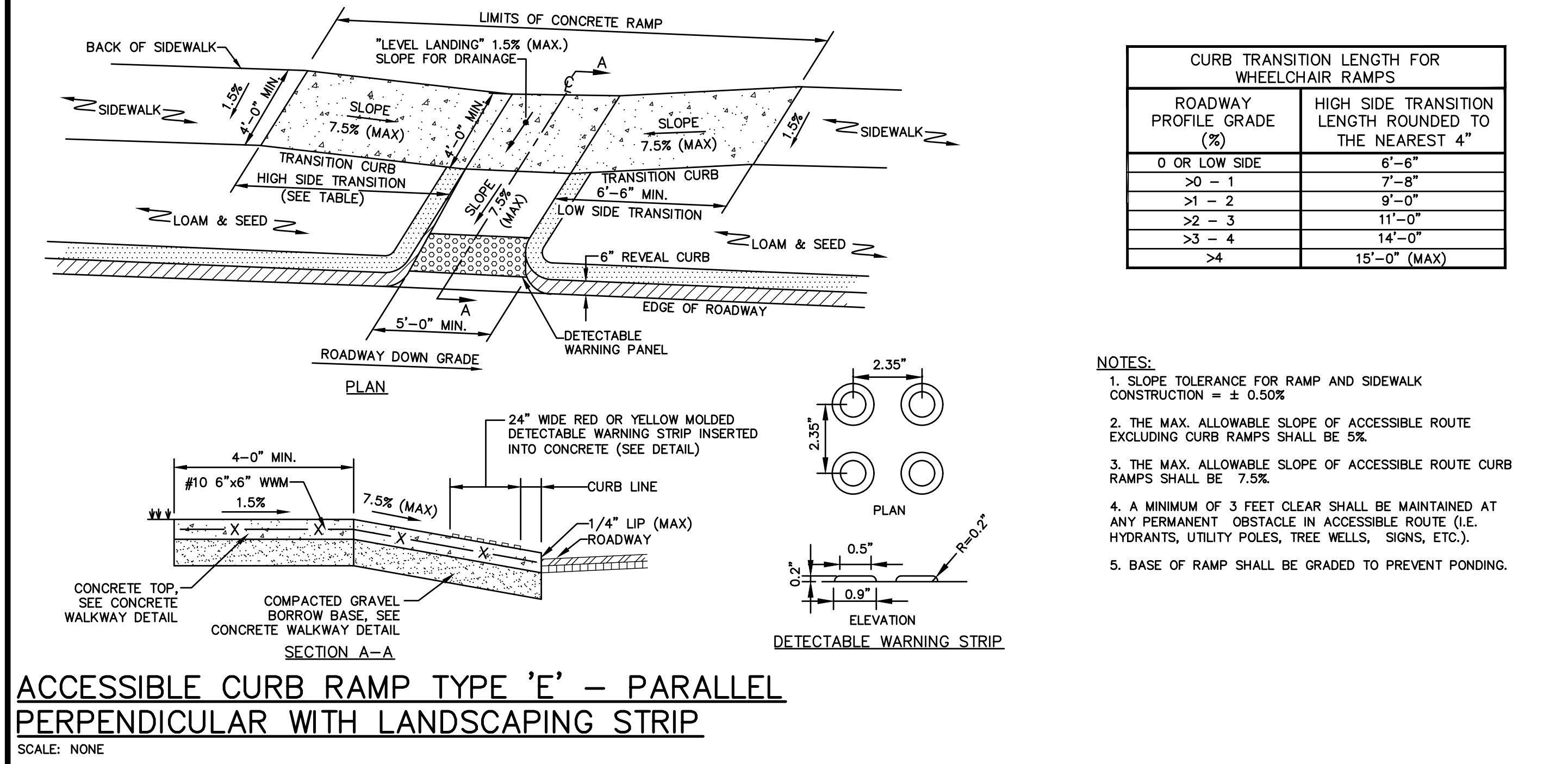
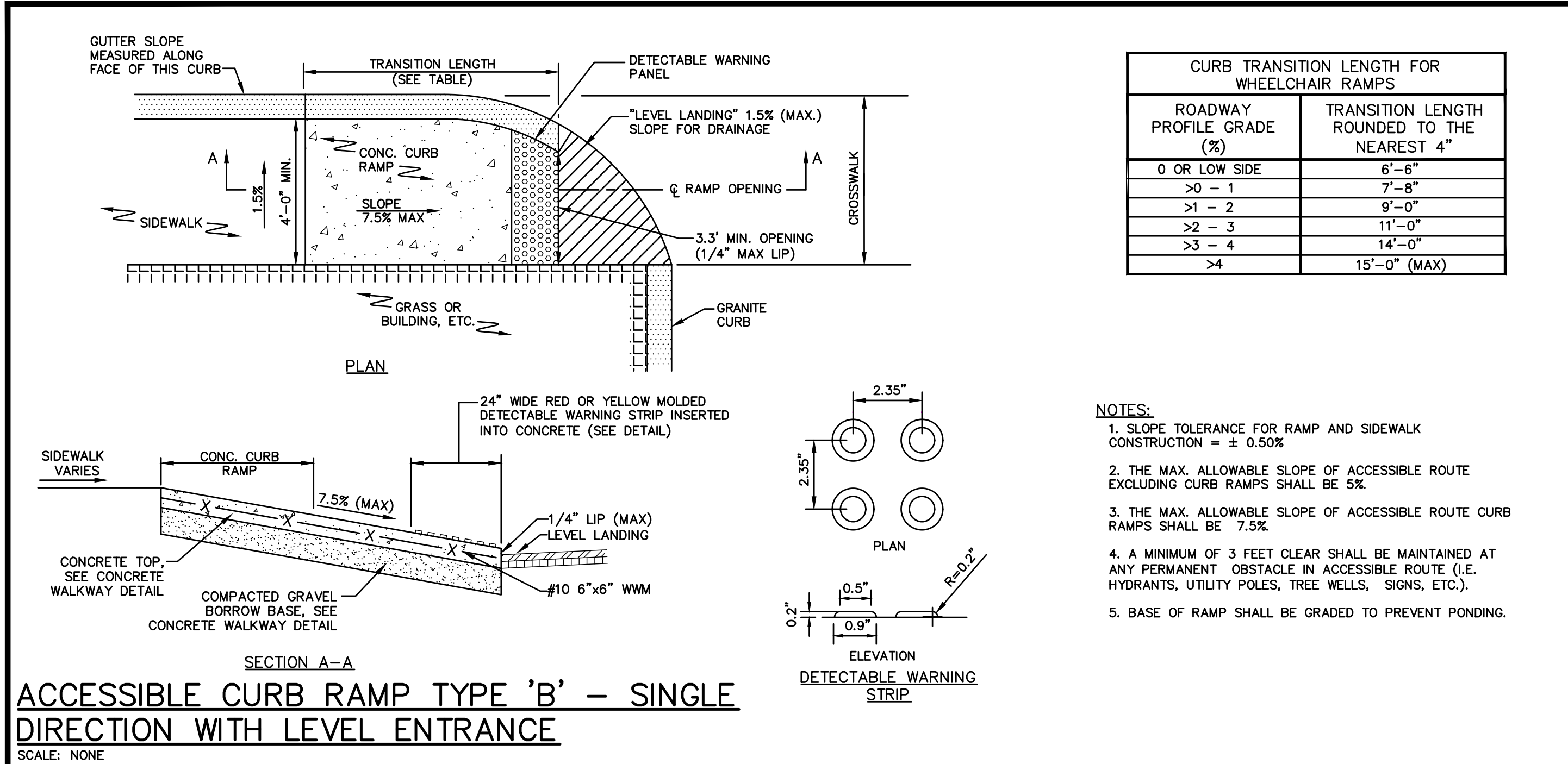
SCALE: AS NOTED

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FILE: 2340702\C\D\2340702-DET

JOB. NO: 23407.02

SHEET C-200



THORNDIKE PLACE
NOTICE OF INTENT

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

CIVIL & LANDSCAPE
DETAILS

SEPTEMBER 6, 2023

REVISIONS:

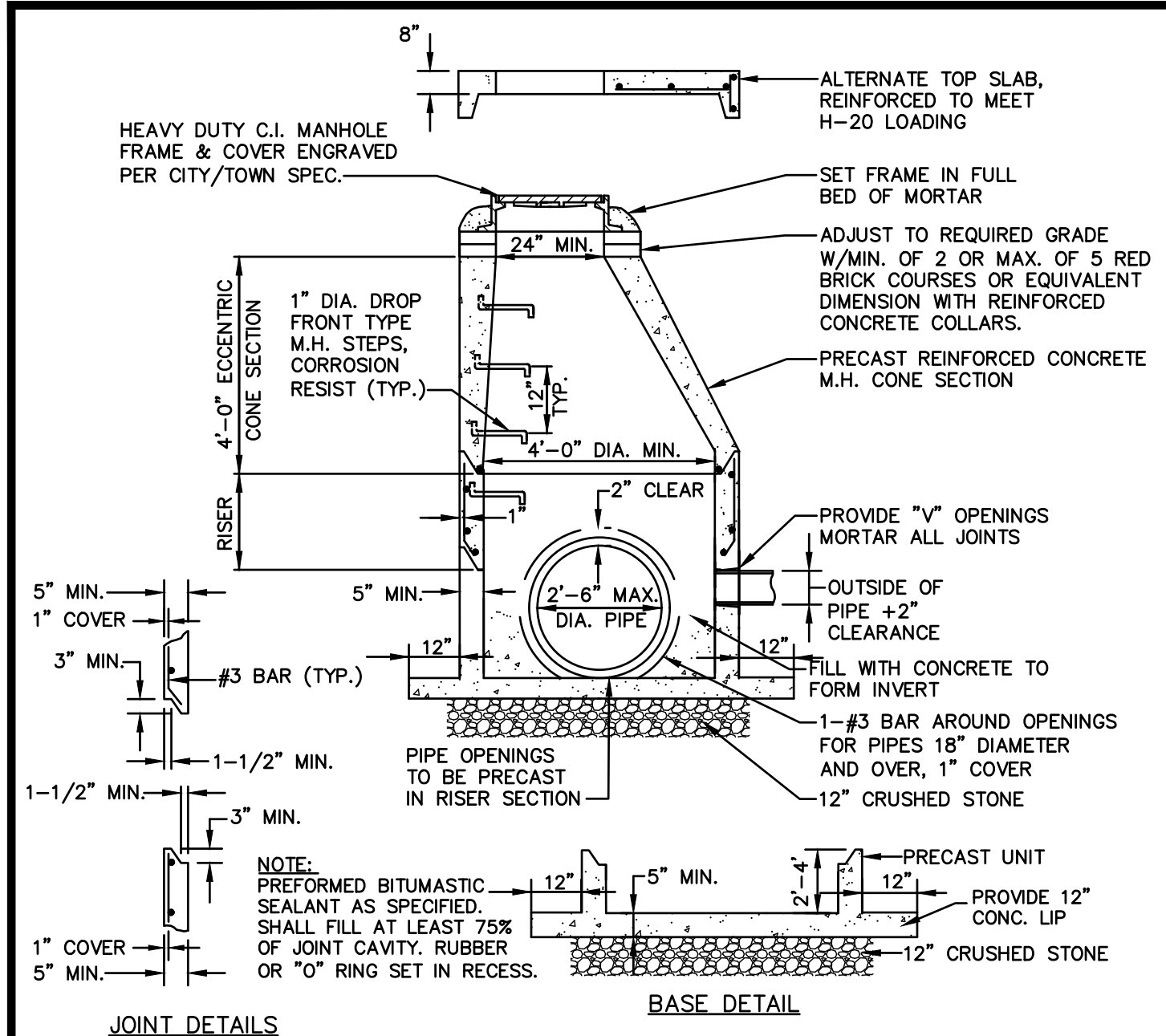
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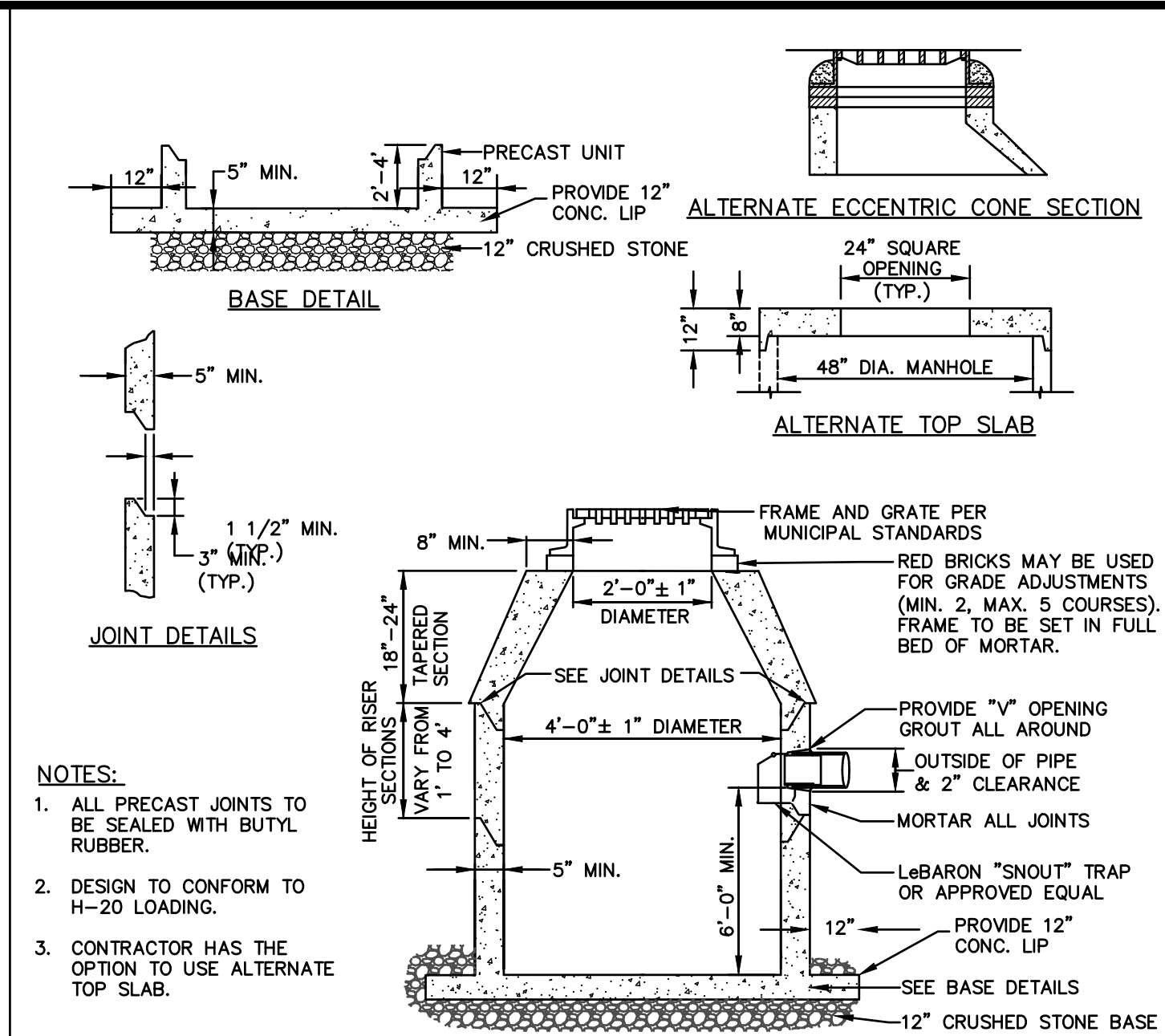
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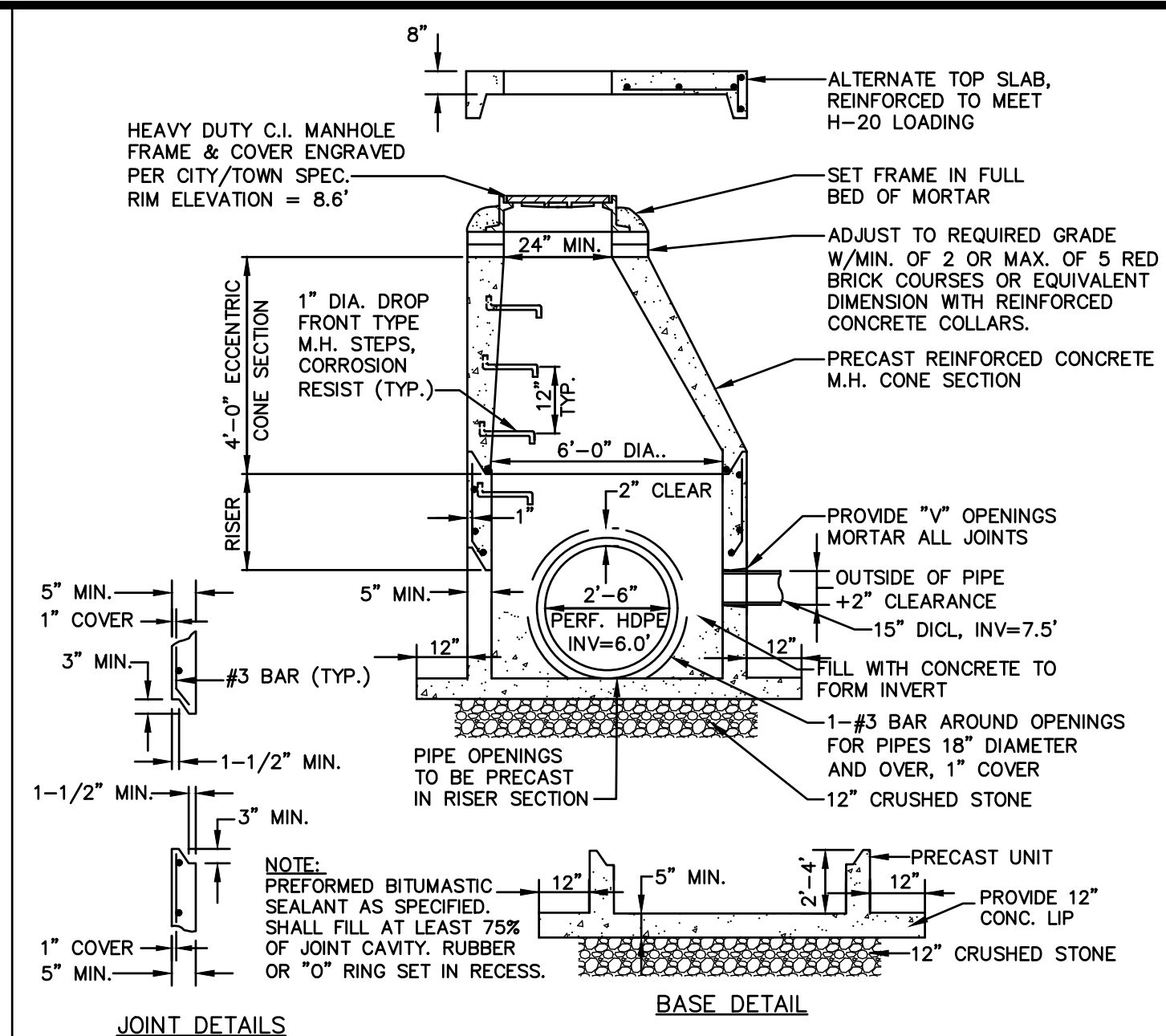
PRECAST CONCRETE DRAIN MANHOLE

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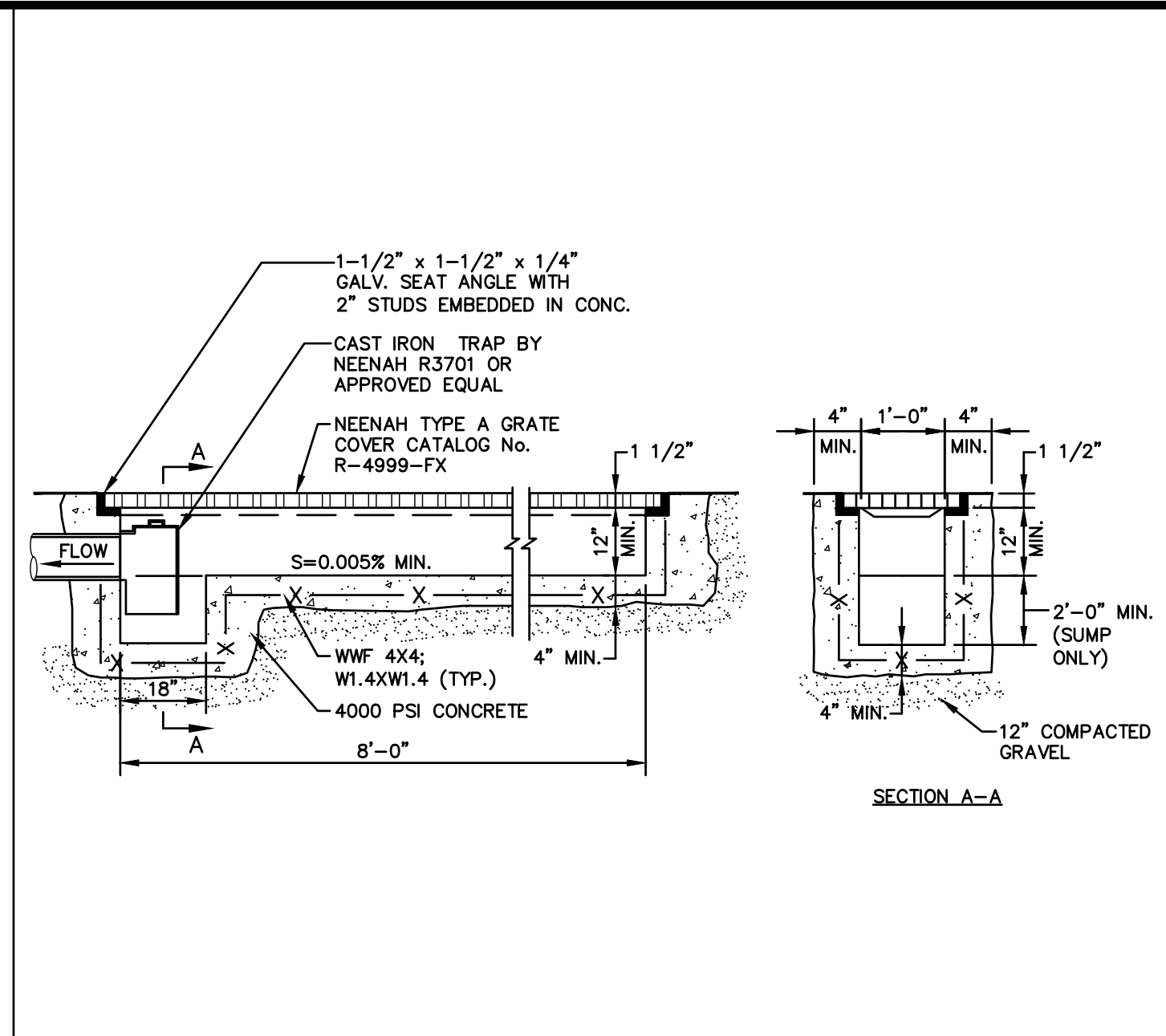
PRECAST CONCRETE CATCH BASIN

SCALE: NONE



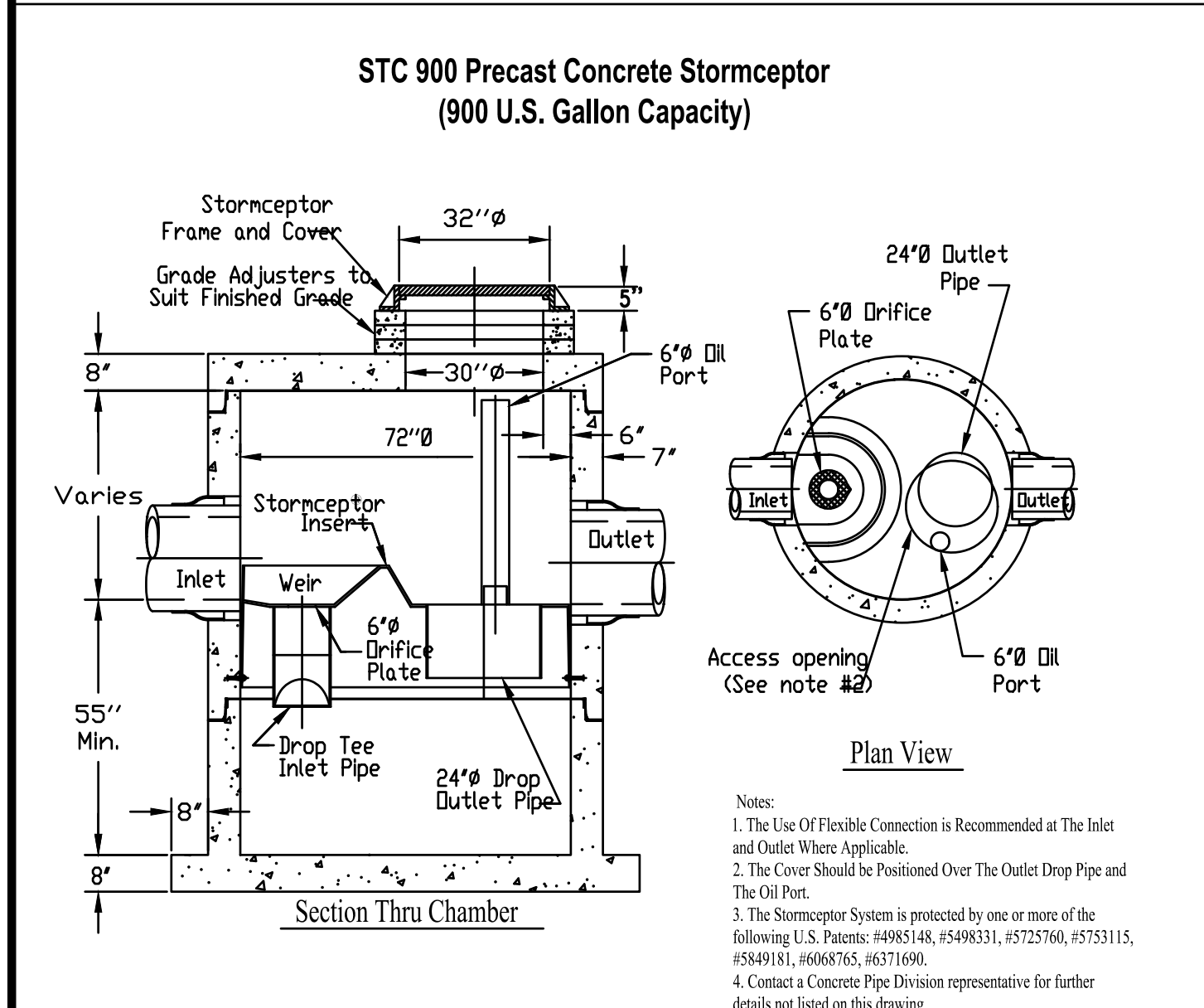
OUTLET CONTROL STRUCTURE (OCS)

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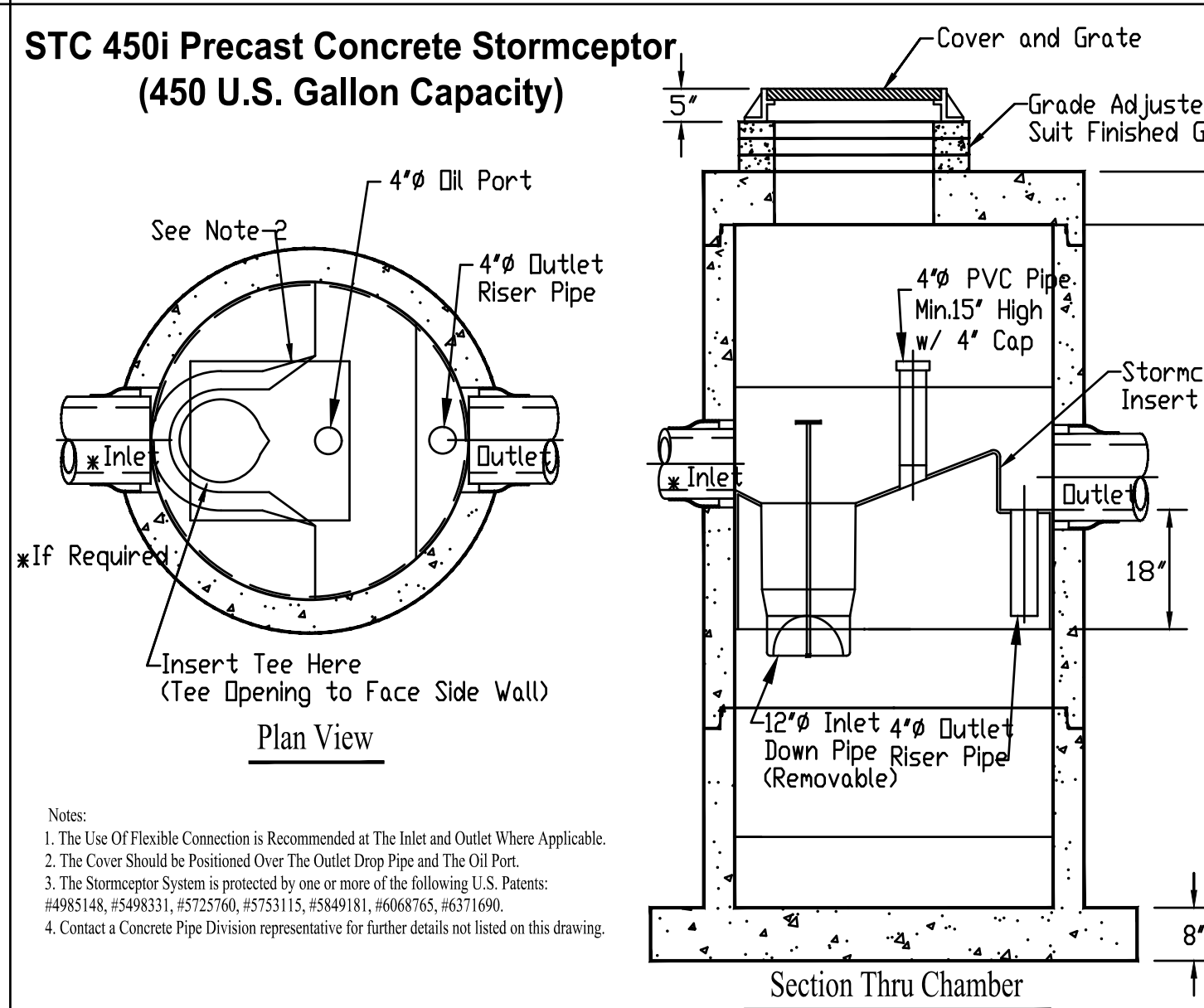
CAST IN PLACE CONCRETE TRENCH DRAIN

SCALE: NONE



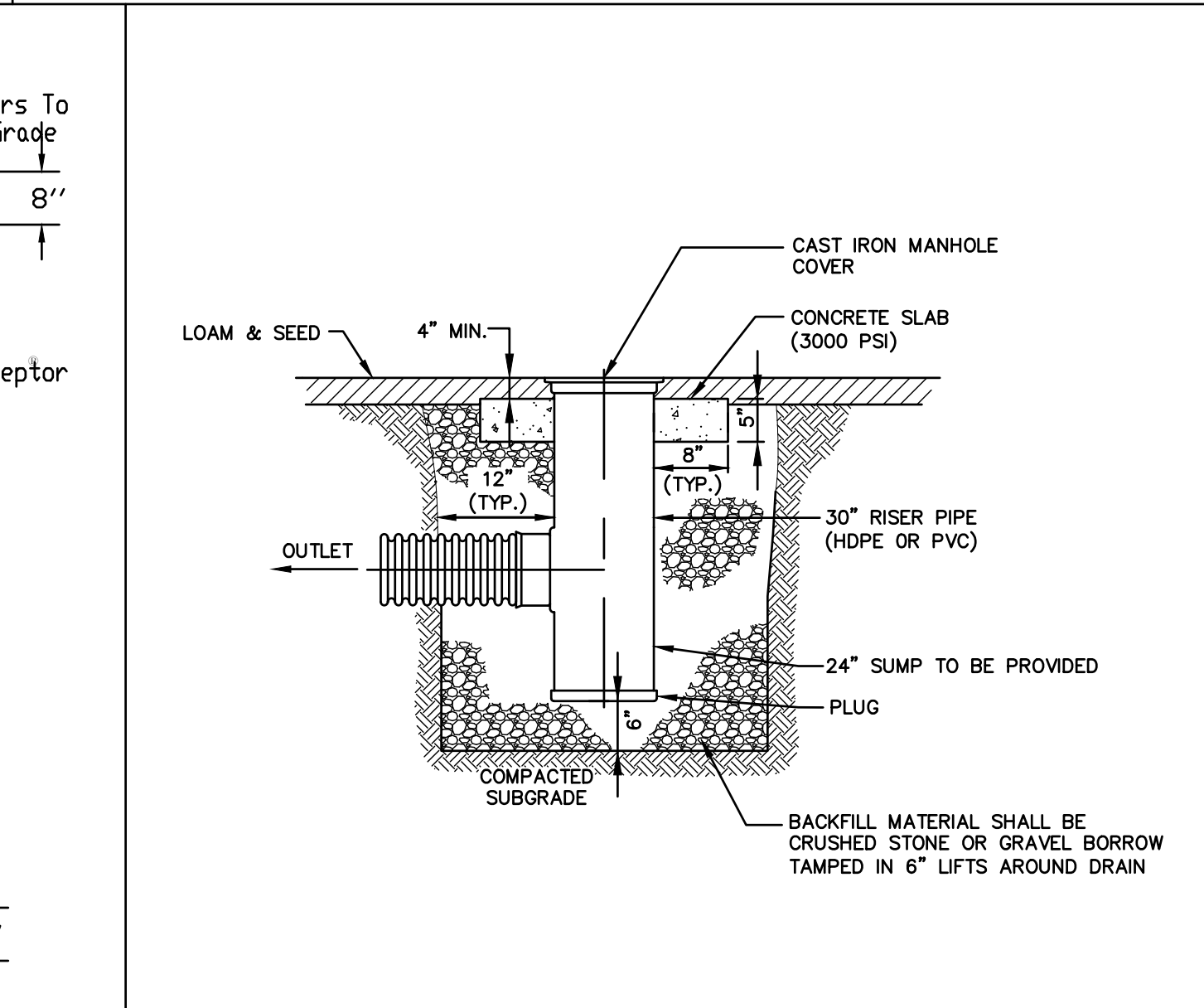
WATER QUALITY UNIT (STORMCEPTOR OR APPROVED EQUAL)

SCALE: NONE



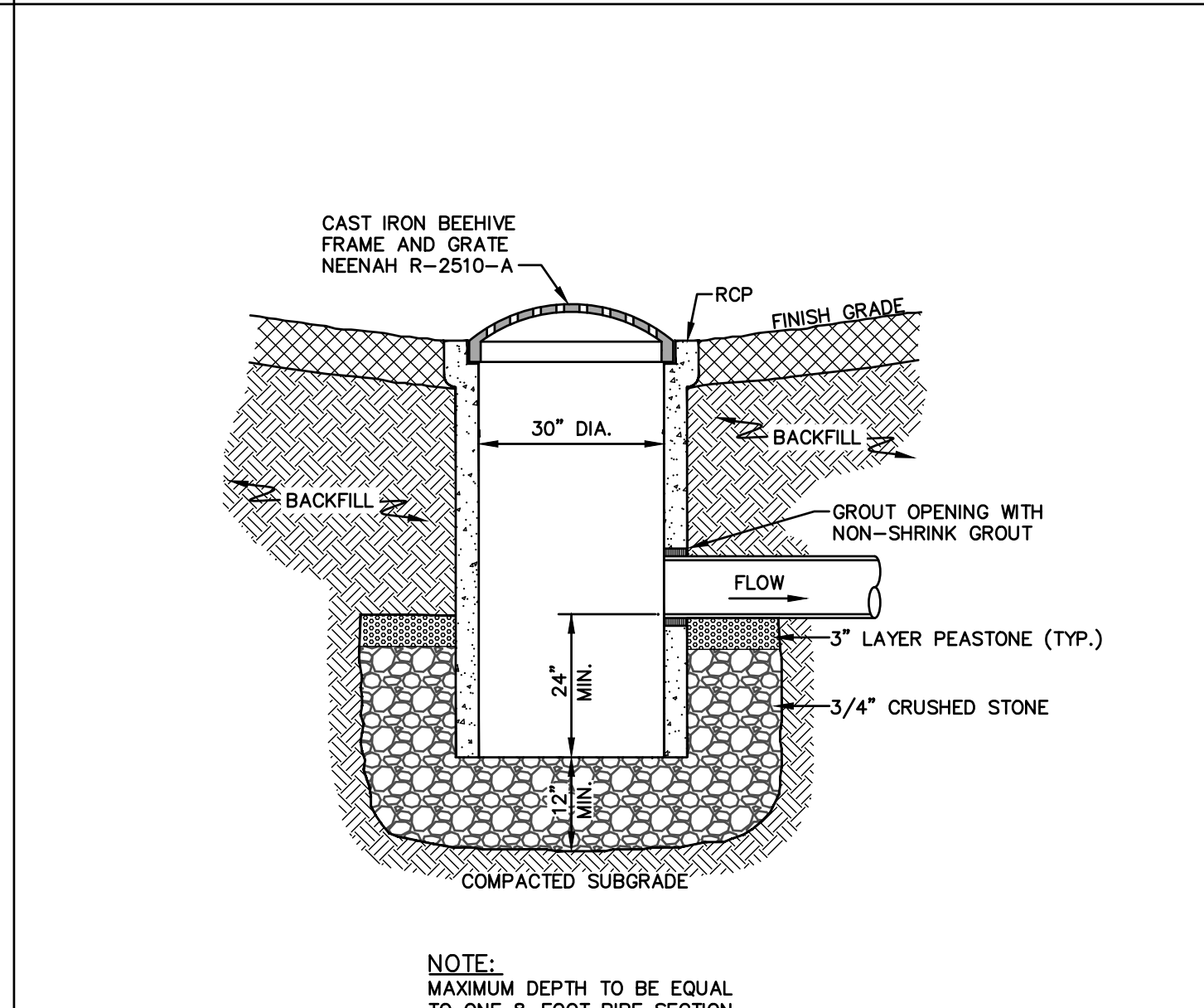
WATER QUALITY CATCH BASIN (STORMCEPTOR 450i OR APPROVED EQUAL)

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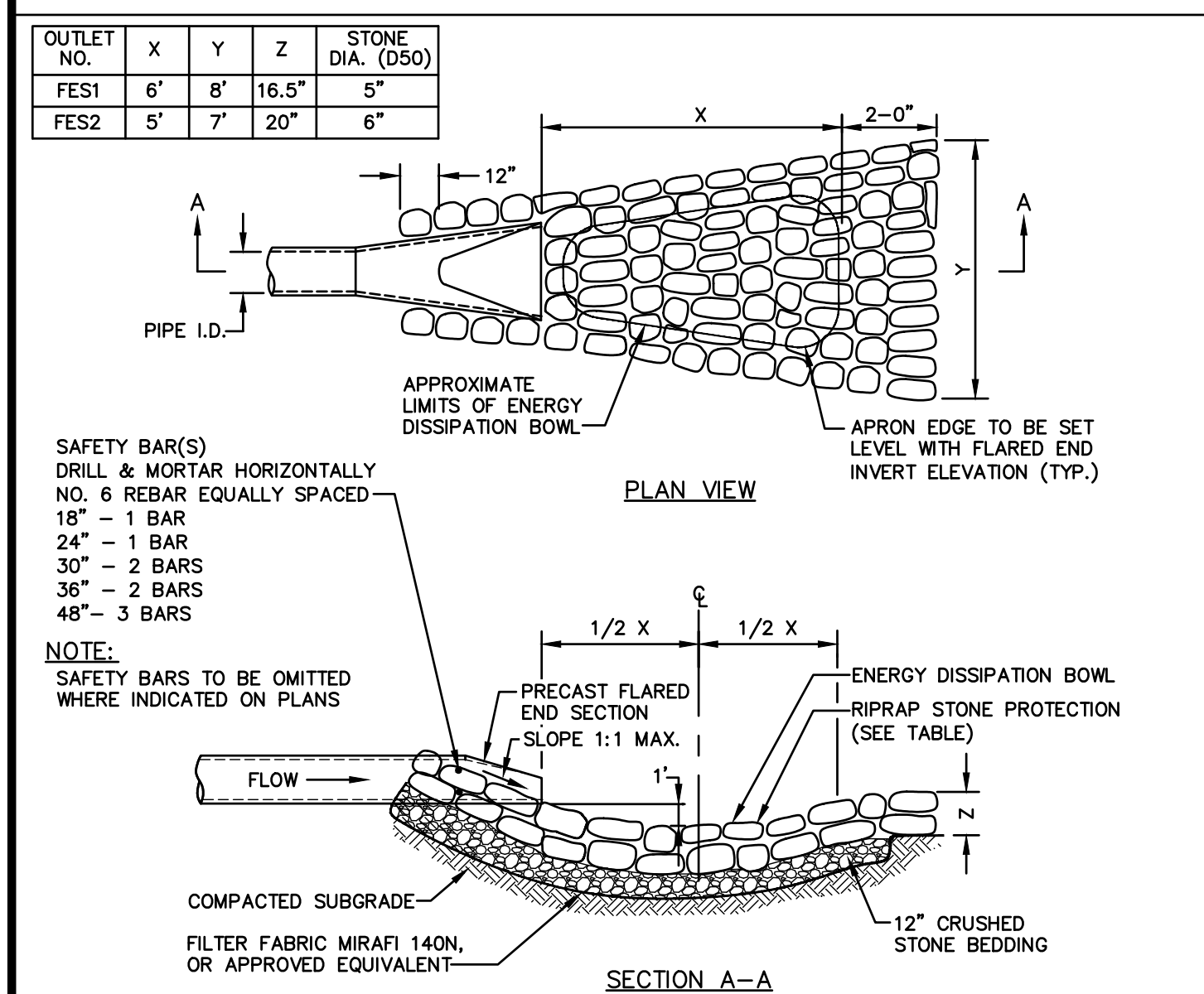
SUMP MANHOLE FROM TRENCH DRAINS

SCALE: NONE



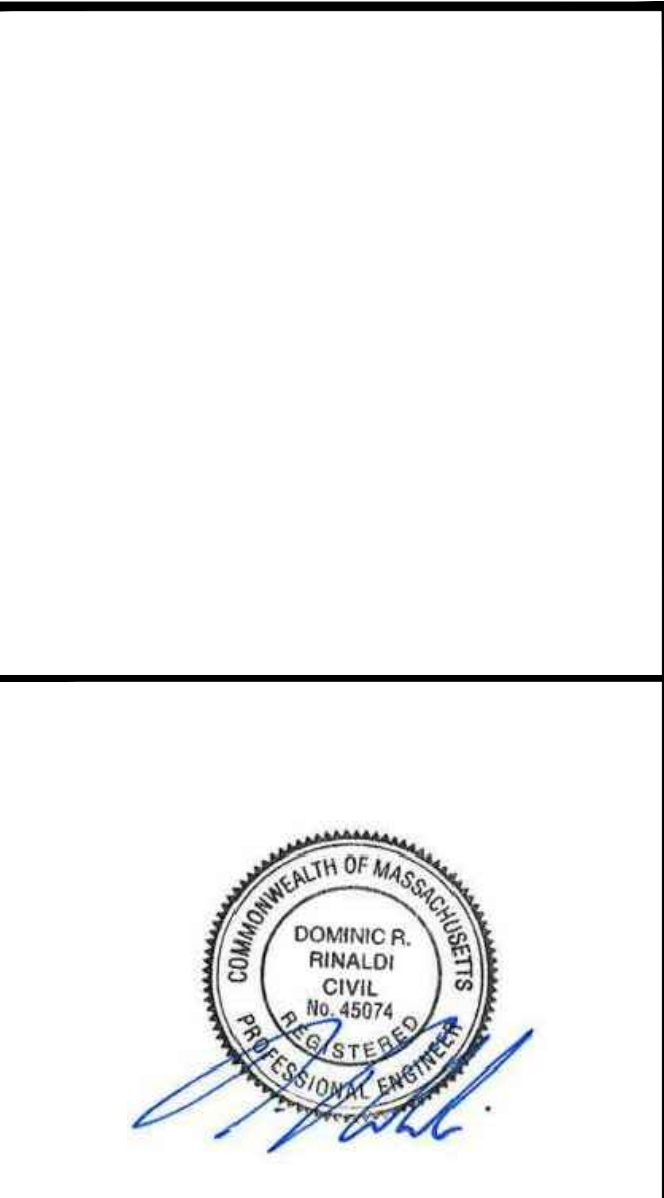
AREA DRAIN

SCALE: NONE



FLARED END SECTION W/ STONE PROTECTION (DISSIPATION BOWL)

SCALE: NONE



PROFESSIONAL ENGINEER

THORNDIKE PLACE NOTICE OF INTENT

DOROTHY ROAD
IN
ARLINGTON
MASSACHUSETTS
(MIDDLESEX COUNTY)

CIVIL & LANDSCAPE
DETAILS

SEPTEMBER 6, 2023

NO.	DATE	DESC.

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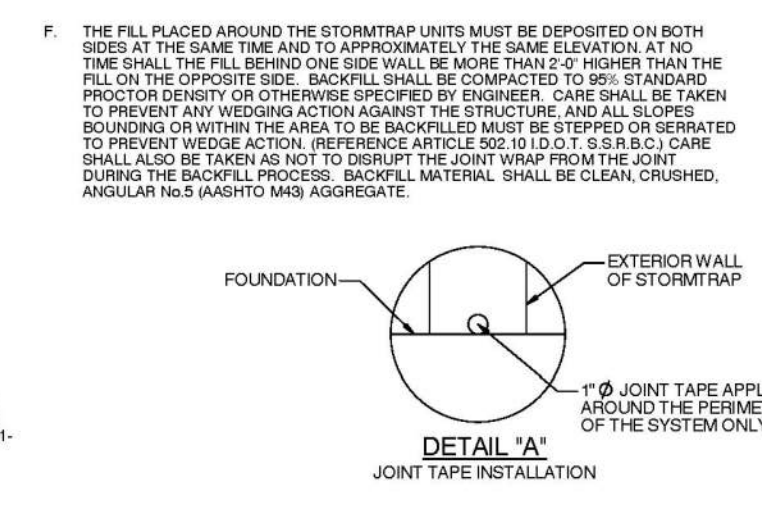
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DWG: SHEET C-202
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STORMTRAP INSTALLATION SPECIFICATION

- STORMTRAP MODULES SHALL BE MANUFACTURED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/OUTLET PIPE OPENINGS.
- STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891-08 STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES. THE FOLLOWING ADDITIONAL EXCEPTIONS SHALL BE OBSERVED:
 - SPECIFICATIONS ON THE ENGINEER'S DRAWINGS SHALL TAKE PRECEDENCE.
 - STORMTRAP MODULES SHALL BE PLACED ON LEVEL FOUNDATION (SEE SHEET 3.1) WITH A 1" OVERHANG ON ALL SIDES THAT SHALL BE FOUNDED IN PLACE BY INSTALLING CONTRACTOR.
 - THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED 3/4". IF THE SPACE EXCEEDS 3/4", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.
 - THE PERIMETER HORIZONTAL JOINT OF THE STORMTRAP MODULES SHALL BE SEALED TO THE FOUNDATION WITH PERFORMED MASTIC JOINT SEALER ACCORDING TO ASTM C891-08.8 AND 9.12. (SEE DETAIL "A").
 - ALL EXTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH PRE-FORMED, COLLOID-APPLIED, SELF-ADHERING ELASTOMERIC RESIN BOKDED TO A WOVEN HIGHLY PUNCTURE RESISTANT POLYMER WRAP CONFORMING TO ASTM C891-09 AND SHALL BE 2" INTEGRATED PRIMER SEALANT AS APPROVED BY STORMTRAP. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:
 - USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE JOINT WHERE THE JOINT WRAP IS TO BE APPLIED.
 - A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE, BUTYL SIDE DOWN AROUND THE STRUCTURE. REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

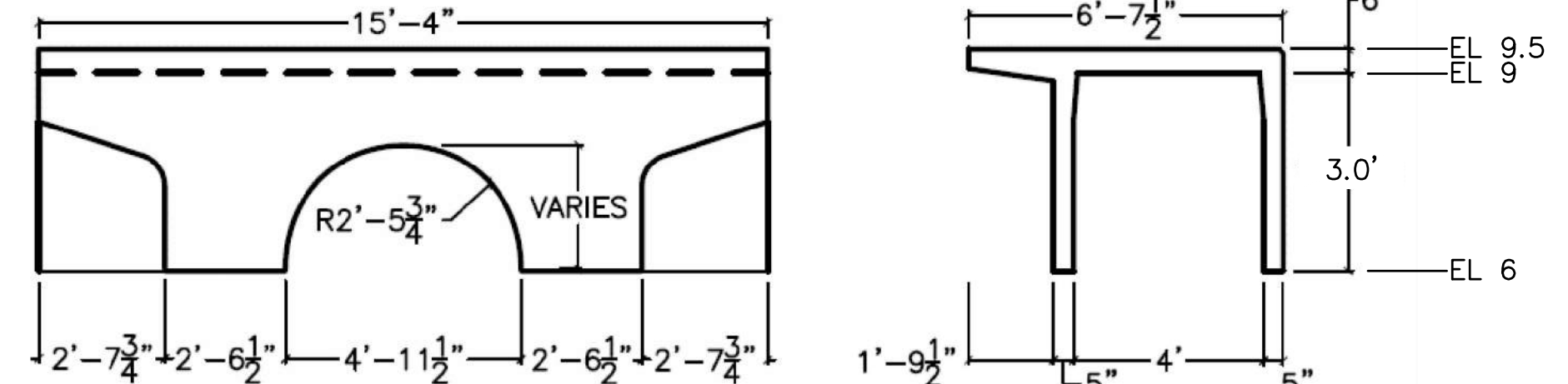
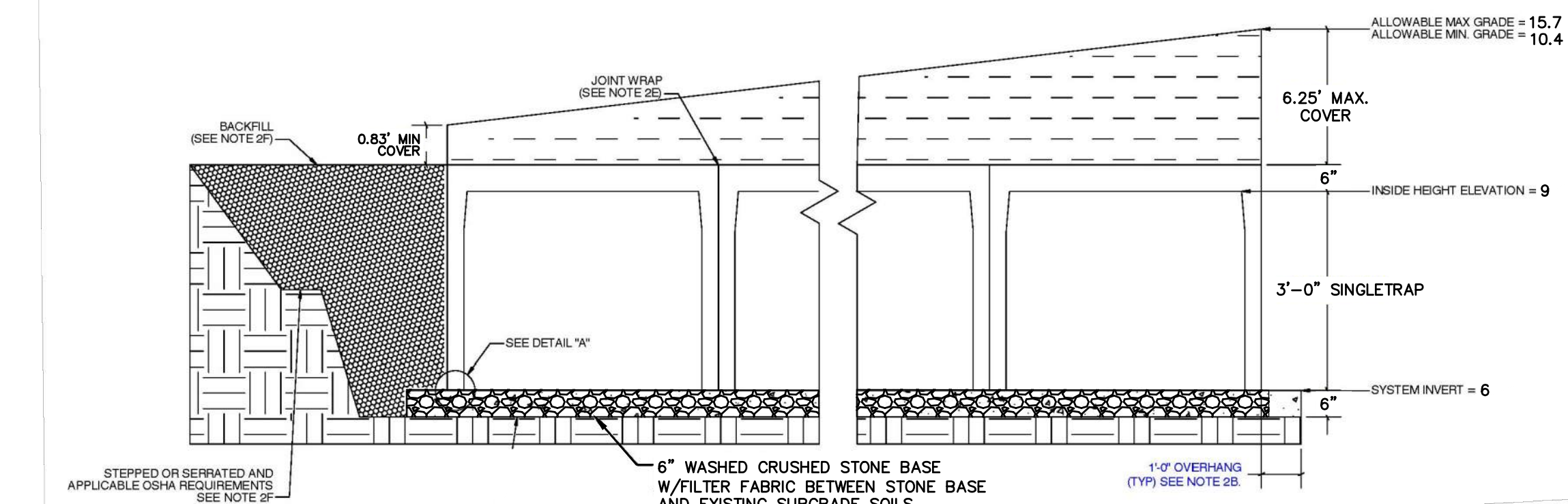
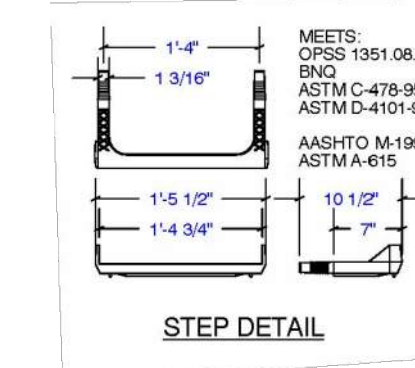


RECOMMENDED PIPE OPENING SPECIFICATION

- PIPE OPENINGS SHALL MAINTAIN A MINIMUM 1'-0" OF CLEARANCE FROM A VERTICAL EDGE OF THE STORMTRAP UNIT.
- MAXIMUM OPENING SIZE TO BE DETERMINED BY UNIT HEIGHT. PREFERRED OPENING SIZE 24" OR LESS. ANY OPENING NEEDED THAT DOES NOT FIT THIS CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.
- CONNECTING PIPES SHALL BE INSTALLED WITH A 1'-0" CONCRETE COLLAR AND A AGGREGATE CIRCLE FOR AT LEAST ONE PIPE LENGTH AS SHOWN. A STRUCTURAL GRADE CONCRETE OR GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
- THE ANGULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH NON-SHRINK GROUT.

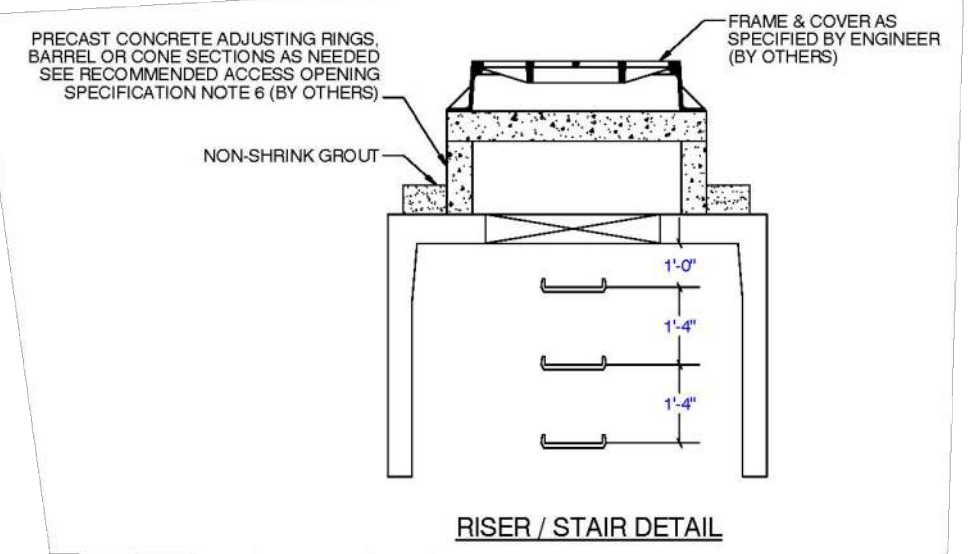
RECOMMENDED PIPE INSTALLATION INSTRUCTIONS

- CLEAN AND LIGHTLY LUBRICATE ALL OF PIPE TO BE INSERTED INTO STORMTRAP.
- IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. REVEL AND LUBRICATE LEAD END OF PIPE.
- ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.



STORMTRAP SINGLE TRAP (SECTION VIEW)

NOTE: ONE ACCESS TO BE PROVIDED ON EACH DUPLEX INFILTRATION SYSTEM. 7 TOTAL ACCESS RISERS TO BE PROVIDED ON MAIN INFILTRATION SYSTEM - ONE ON EACH UNIT WITH AN INLET OR OUTLET PIPE.



RECOMMENDED ACCESS OPENING SPECIFICATION

- TYPICAL ACCESS OPENINGS FOR THE STORMTRAP SYSTEM ARE 2'-0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 2'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE IN ALL DIRECTIONS FROM THE EDGE OF THE STORMTRAP UNITS.
- PLASTIC-COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PS-PPC (SEE DETAIL TO THE RIGHT) ARE PROVIDED INSIDE ANY UNIT WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE UNIT IS TO BE PLACED AT A MINIMUM OF 1'-0" FROM THE EDGE OF THE STORMTRAP UNITS. ALL ENLARGED STEPS SHALL BE PLACED WITH A MAXIMUM DISTANCE OF 1'-4" BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE UNIT.
- STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO COINCIDE WITH THE ACCESS OPENING OR THE CENTER OF GRAVITY OF THE UNIT AS NEEDED.
- STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.
- ACCESS OPENINGS SHOULD BE LOCATED IN ORDER MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST ONE ACCESS OPENING PER SYSTEM FOR ACCESS AND INSPECTION.
- USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE SECTIONS. (BY OTHERS)

NOTES:

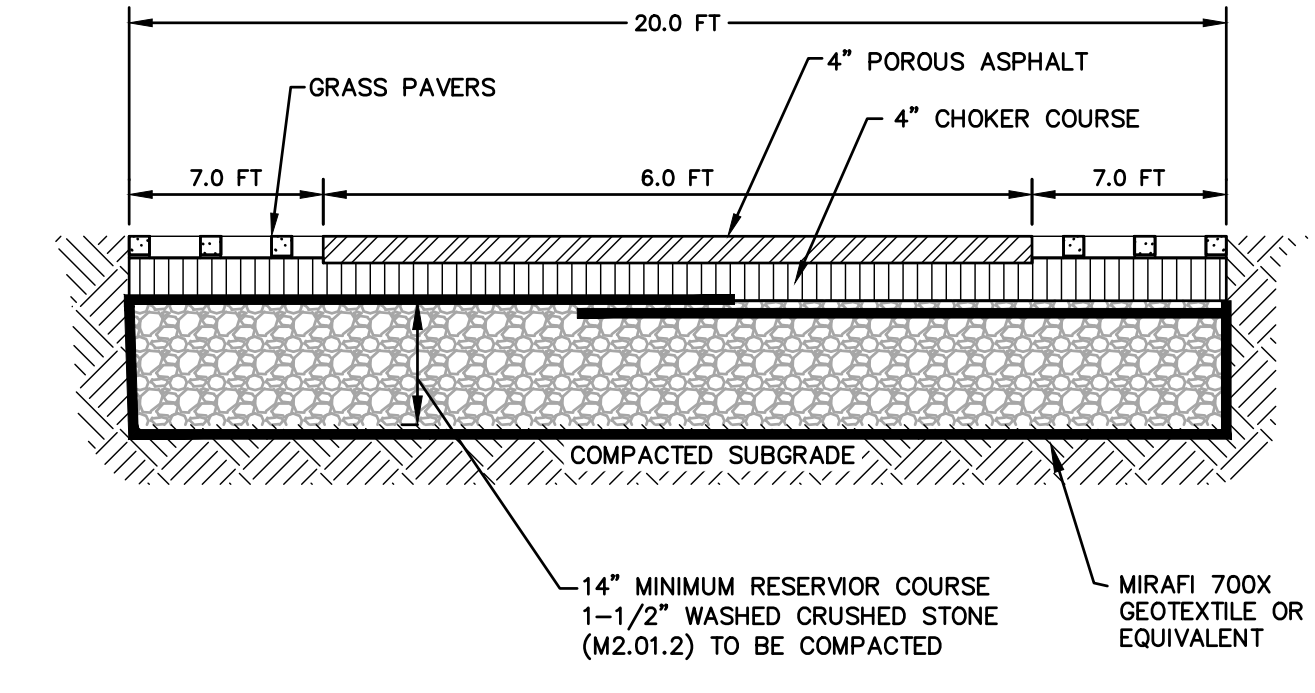
- POROUS ASPHALT AND CHOKER COURSES SHALL MEET THE FOLLOWING REQUIREMENTS:

4" POROUS ASPHALT - SHALL BE POST-BLENDED PG 64-28 SBR WITH 5 POUNDS OF FIBER PER TON OF ASPHALT MIX.

- 3/4" = 100%
- 1/2" = 85-100%
- 3/8" = 55-75%
- #4 = 10-25%
- #5 = 5-10%
- #200 = 2-4%
- AIR VOID CONTENT = 16-22%

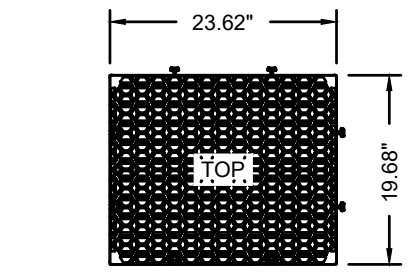
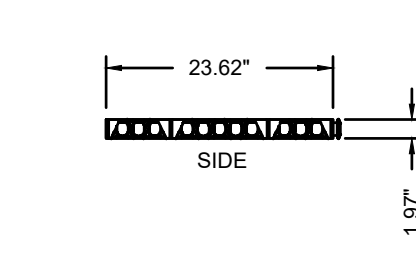
4" CHOKER COURSE SHALL MEET THE FOLLOWING GRADUATION REQUIREMENTS:

- 1-1/2" = 100%
- 1" = 95-100%
- 1/2" = 25-60%
- #4 = 0-10%
- #5 = 0-5%
- 95% COMPACTION



EMERGENCY ACCESS ROAD

SCALE: NONE



MODULE DATA	
GEOMETRY: LENGTH = 23.62 IN. (600 MM) WIDTH = 19.68 IN. (500 MM) HEIGHT = 1.97 IN. (50 MM) TANK VOLUME = 0.53 CF STORAGE VOLUME = 0.48 CF VOID INTERNAL VOLUME: 90% VOID SURFACE AREA: 90%	LOAD RATING: 240.20 PSI (MODULE ONLY) HS20/HS25 - SEE SPEC FOR COVER REQUIREMENTS MATERIAL: 100% RECYCLED POLYPROPYLENE MAXIMUM STACK HEIGHT: 60 PANELS

06/10/2022

R-TANK^{XD} PANEL

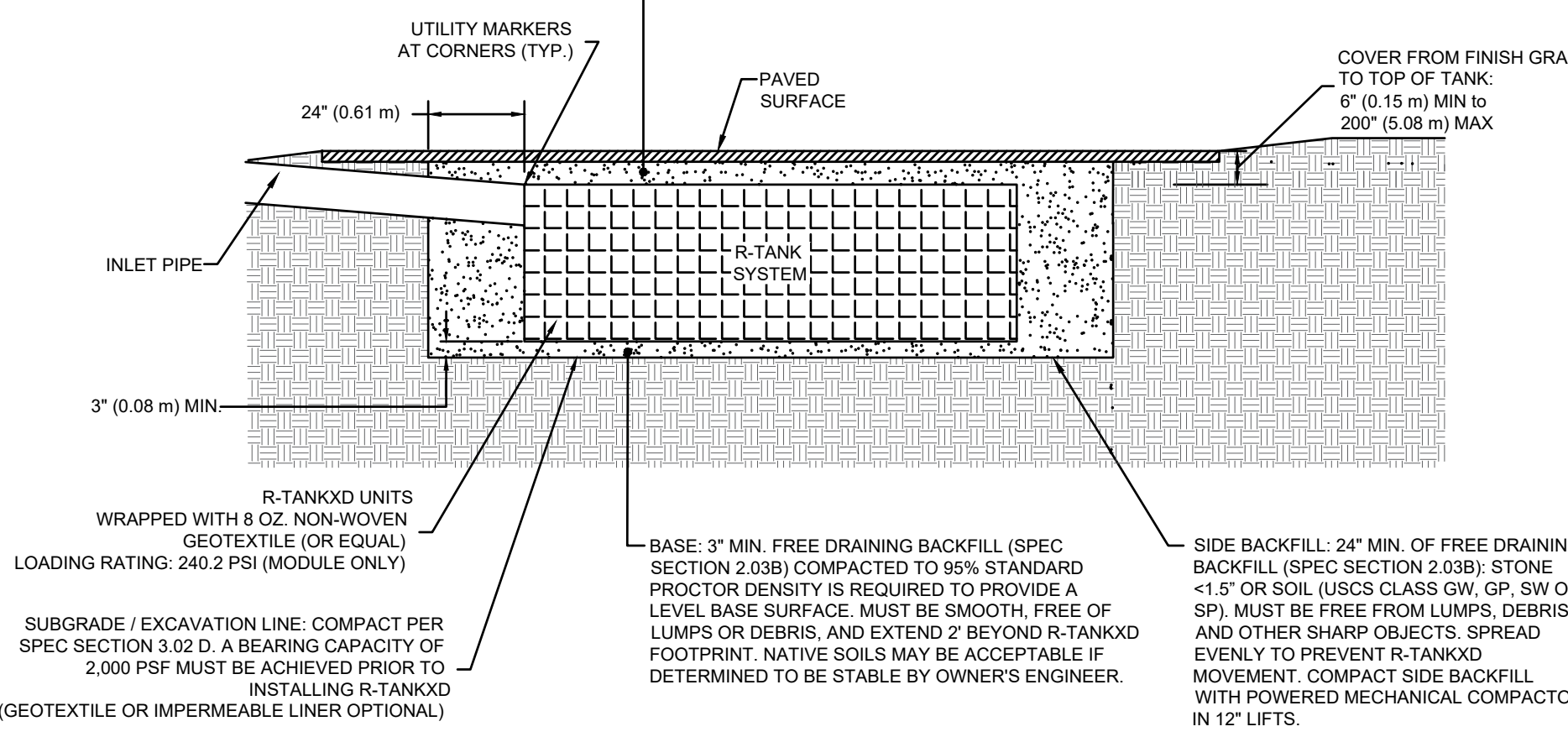
SCALE: NONE

UNDERGROUND INFILTRATION (STORMTRAP SINGLE TRAP OR APPROVED EQUAL)

SCALE: NONE

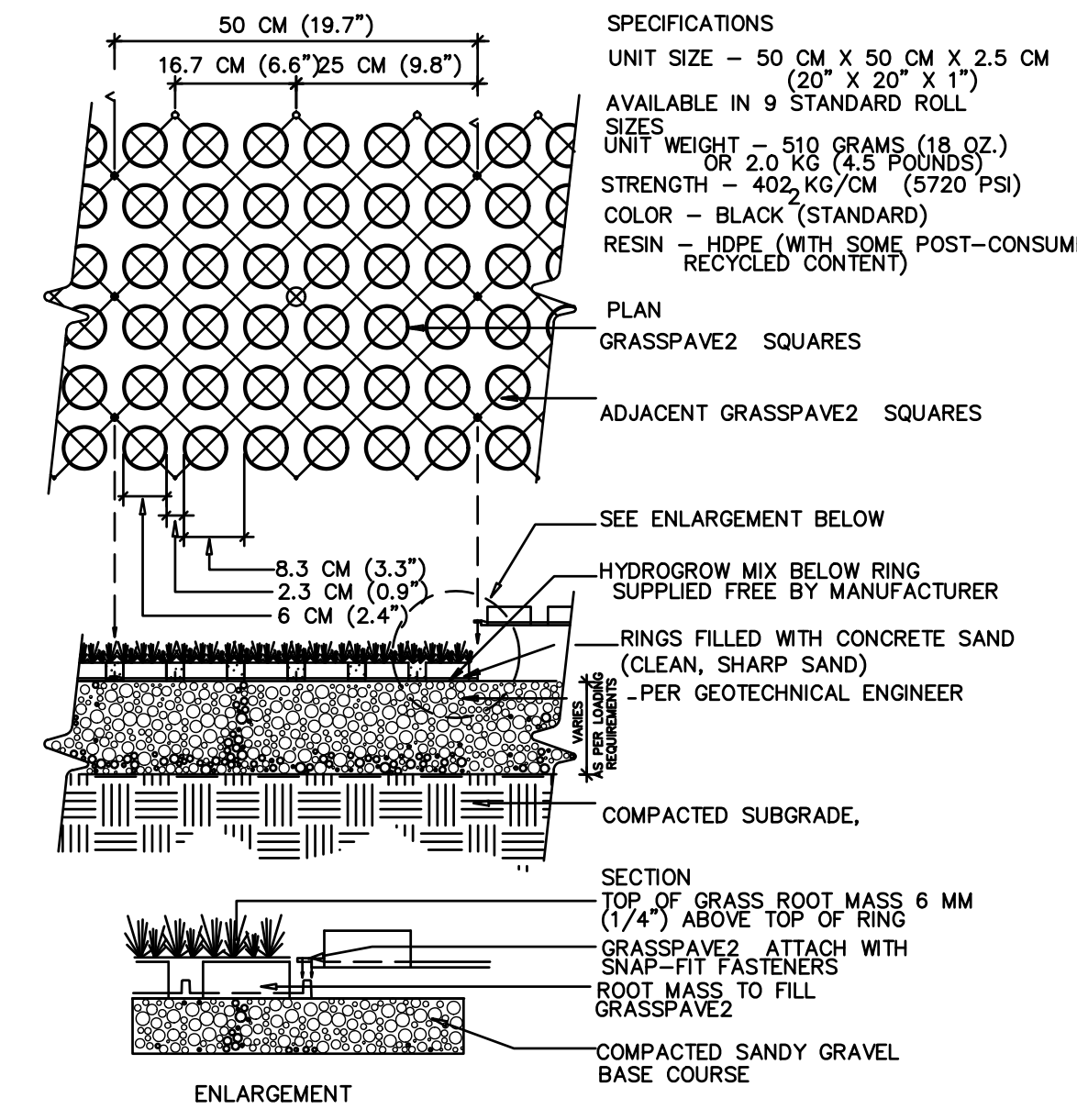
TOTAL COVER: 6" MINIMUM AND 200" MAXIMUM. INITIAL COVER UP TO 12" MUST BE FREE DRAINING BACKFILL (SPEC SECTION 2.03B): STONE <1.5" OR SOIL (USCS CLASS GW, GP, SW OR SP). ADDITIONAL FILL MAY BE STRUCTURAL FILL (SPEC SECTION 2.03C): STONE OR SOIL (USCS CLASS SM, SP, SW, GM, GP OR GW) WITH MAX CLAY CONTENT <10%, MAX 25% PASSING NO. 200 SIEVE, AND MAX PLASTICITY INDEX OF 4. CONTACT FERGUSON WATERWORKS IF MORE THAN 200" OR LESS THAN 6" OF TOP BACKFILL IS REQUIRED (FROM TOP OF TANK TO TOP OF PAVEMENT).

- NOTES:
- FOR COMPLETE MODULE DATA, SEE APPROPRIATE R-TANK^{XD} MODULE SHEET.
 - INSTALLATIONS PER THIS DETAIL MEET GUIDELINES OF HL-93 LOADING PER THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, CUSTOMARY U.S. UNITS, 7TH EDITION, 2014 WITH 2015 AND 2016 INTERIM REVISIONS.
 - PRE-TREATMENT STRUCTURES NOT SHOWN.
 - FOR INFILTRATION APPLICATIONS, GEOTEXTILE ENVELOPING R-TANK SHALL BE ACF M200 (PER SPEC SECTION 2.02A) AND BASE SHALL BE 4" MIN. UNCOMPACTED FREE DRAINING BACKFILL (SPEC SECTION 2.03A) TO PROVIDE A LEVEL BASE. SURFACE MUST BE SMOOTH, FREE OF LUMPS OR DEBRIS, AND EXTEND 2' BEYOND R-TANK^{XD} FOOTPRINT.



R-TANK^{XD} HS20-25 LOADS - SECTION VIEW

SCALE: NONE



GRASSPAVE (OR APPROVED EQUAL)

SCALE: NONE



PROFESSIONAL ENGINEER

THORNDIKE PLACE
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IN
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MASSACHUSETTS
(MIDDLESEX COUNTY)

CIVIL & LANDSCAPE
DETAILS

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JOB. NO: 23407.02	SHEET C-203

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Town of Arlington, Massachusetts

Request for Determination of Applicability: 70 Medford Street (Mt. Pleasant Cemetery Columbarium).

Summary:

Request for Determination of Applicability: 70 Medford Street (Mt. Pleasant Cemetery Columbarium).

The Conservation Commission will hold a public hearing to consider a Request for Determination of Applicability for the construction of a footpath at 70 Medford Street.